City of Lethbridge

Revision to the Copperwood Outline Plan

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Project Number:

G732-003-00

Date:

February, 2010

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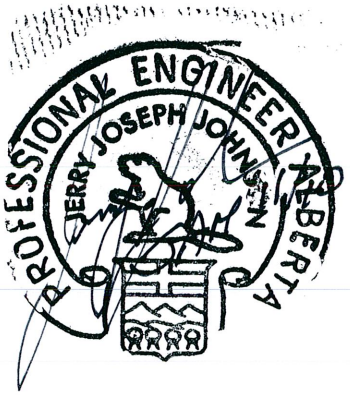
This Statement of Qualifications and Limitations is attached to and forms part of the Report.

Revision Log

Revision #	Revised By	Date	Issue / Revision Description
1	February 2006		Final
2	November 2009		Manufactured Home revisions
3	January 2010		Final Revised Copperwood Outline Plan

AECOM Signatures



Report Reviewed By:

Jerry J. Johnson, B.Sc., MA, P. Eng.,
Senior Engineer

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1. Introduction

1.1 Purpose

This Copperwood Outline Plan provides additional planning definition for facilitating orderly subdivision and development for part of the West Lethbridge Phase II Area Structure Plan. It contains a detailed development concept that outlines land use, municipal infrastructure, local roadways, and staging.

1.2 Location and Area

Copperwood Outline Plan (Copperwood) is located in west Lethbridge. It is situated west of the existing Varsity Village neighbourhood, and south of the future western extension of Whoop-Up Drive (**Figure 1**). The land area comprising Copperwood totals 94.71 hectares.

1.3 Background

The 1964 City of Lethbridge General Plan recommended the development of lands in west Lethbridge, and this initiative was acted on in the West Lethbridge Urbanization Plan of 1969. Residential development in west Lethbridge commenced near the University in 1974, and today is a major growth area with a population of more than 26,000.

Although Copperwood is the first stage of a new area it does constitute a contiguous extension of the existing residential development in west Lethbridge. Copperwood's land use concept further defines part of the West Lethbridge Phase II Area Structure Plan (ASP), which was adopted in 2005 as a development framework for approximately 698 hectares of land. The ASP provides for a Community Core for west Lethbridge, north of Whoop-Up Drive and two complementary villages, one north and one south of Whoop-Up Drive. Copperwood is part of the south village area.

1.4 Adjacent Planning Areas

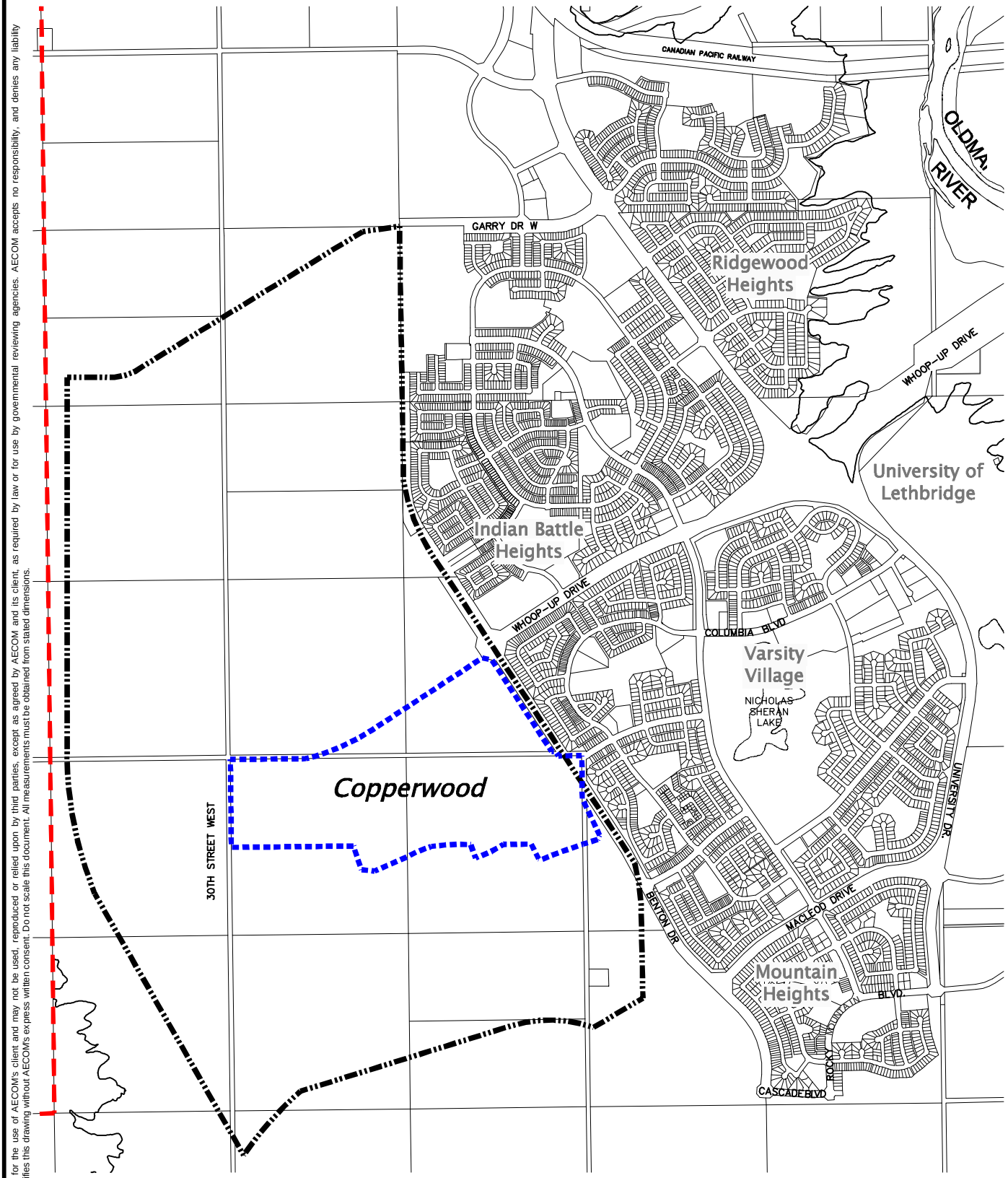
Copperwood is located west of the Varsity Village neighbourhood and southwest of Indian Battle Heights. Both of these adjacent neighbourhoods are fully developed. All other areas to the west, south, and north of the ASP are currently undeveloped agricultural lands within the City's boundary.

1.5 Property Ownership

The properties that comprise the Copperwood plan area are owned by the City of Lethbridge and four private landholders. These landowners and their respective holdings are listed in **Table 1-1**, and shown graphically in **Figure 2**. Current land titles for all parcels are attached in **Appendix A**.

Daytona Urban Development Corporation has a registered agreement for purchase on the Lot 2, Block 1, Plan 051 2218.

The City of Lethbridge has a registered agreement for purchase on the SE quarter of Section 22, Township 8, Range 22, and West of the 4th Meridian.



LEGEND

- COPPERWOOD OUTLINE PLAN BOUNDARY
- WEST LETHBRIDGE PHASE II ASP BOUNDARY
- CITY OF LETHBRIDGE BOUNDARY

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Daytona Urban Development Corp
Copperwood, West Lethbridge
Outline Plan

Location Plan

Figure - 1

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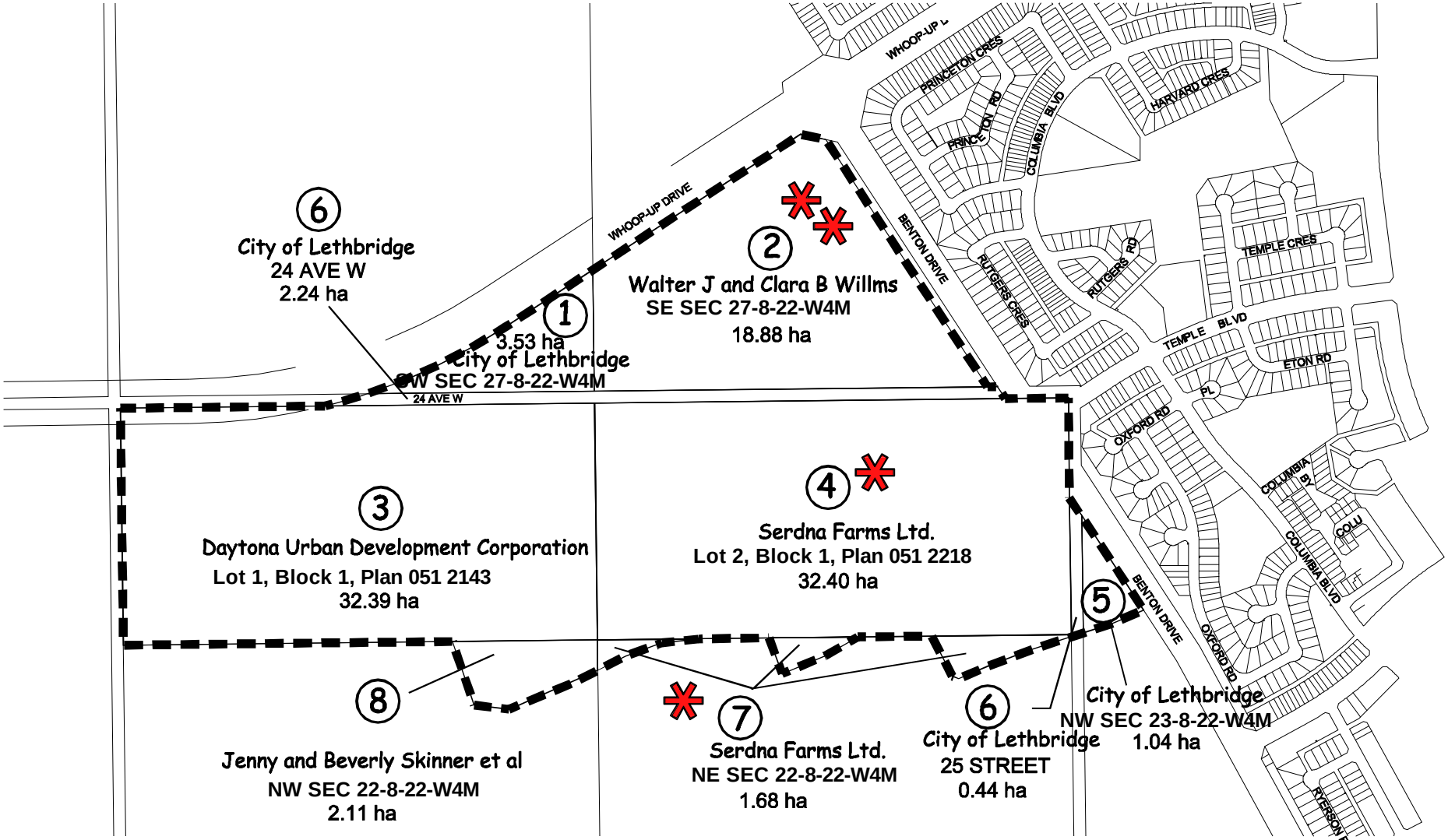

LEGEND

- COPPERWOOD OUTLINE PLAN BOUNDARY
- * AGREEMENT TO PURCHASE OR RIGHT OF FIRST REFUSAL IN FAVOR OF DAYTONA URBAN DEVELOPMENT CORPORATION
- ** AGREEMENT TO PURCHASE BY CITY OF LETHBRIDGE

SCALE 1:1000

0 100 200 300 m

Daytona Urban Development Corp
Copperwood, West Lethbridge
Outline Plan

Land Ownership

Figure - 2

Table 1-1 - Property Ownership

	Legal Description	Landowner	Certificate of Title	Area (ha)
1.	Part SW 27-8-22-WM4	City of Lethbridge	841 077 241	3.53
2.	Part SE 27-8-22-WM4	**Walter J and Clara B Willms	031 220 099 +55	18.88
3.	Lot 1,Blk 1,Plan 051 2143	Daytona Urban Development Corporation	051 220 164	32.39
4.	Lot 2,Blk 1,Plan 051 2218	* Serdna Farms Ltd.	051 226 360	32.40
5.	Part NW 23-8-22-WM4	City of Lethbridge	751 130 428	1.04
6.	Existing Section Roads (24 Avenue & 25 Street)	City of Lethbridge	Right-of-Ways	2.68
7.	Part NE 22-8-22-WM4	* Serdna Farms Ltd.	051 220 164 +1	1.68
8.	Part NW 22-8-22-WM4	Jenny and Beverly Skinner	051 213 774 +1	2.11

* Agreement to Purchase, or Right of First Refusal, registered on title in favour of Daytona Urban Development Corporation.

** Agreement to Purchase, or Right of First Refusal, registered on title in favour of the City of Lethbridge.

*Major parcels still reflect the above at time of January 2010 amendment. Due to development many residential owners exist at time of development in existing phases.

1.6 Outline Plan Policy Context

The policy context that gives authority to this outline plan as a City planning document is explained below.

1.7 Municipal Government Act

The Municipal Government Act (MGA), RSA 2000, c. M-26, is the primary planning legislation within the Province of Alberta. The MGA authorises municipalities to adopt Municipal Development Plans, Area Structure Plans, and Land Use Bylaws that form a hierarchy of statutory planning documents that guide development of the municipality in an orderly manner.

1.8 Municipal Development Plan

The City of Lethbridge Municipal Development Plan (MDP), Bylaw No. 5320 adopted on May 16, 2005, states the City's objectives and policies for coordinating the orderly growth and development of the City.

Map 2, Future Residential Growth Areas of the MDP designates the Copperwood area for residential development.

1.8.1 Area Structure Plan

An Area Structure Plan (ASP) is a statutory planning document authorized by the MGA under Section 633. Any ASPs must conform to the City's Municipal Development Plan, and Section 638 of the MGA further requires that it must describe:

- sequencing of development
- proposed land uses, either generally or specifically
- population density
- the general location of major transportation and public utilities
- any other planning matters that Council may consider necessary.

The Copperwood lands fall within the boundaries of the West Lethbridge Phase II Area Structure Plan which was adopted by Council in May 2005.

1.8.2 Historical Resource Assessment

A Historical Resource Review was performed as part of the ASP for both the north and south villages and the clearance letter received from Alberta Community Development is enclosed in **Appendix C**.

1.8.3 Outline Plan

An Outline Plan is an intermediate planning document required under an ASP in the City of Lethbridge, and it functions as a mechanism for implementing various stages of an ASP. The Outline Plan is approved by the Municipal Planning Commission. The Outline Plan identifies specific sites for the land uses shown conceptually on the area structure plan. It also shows in more detail roads, open space and trail networks, stormwater management systems and utility servicing and staging. Proposed subdivisions and redistricting applications must comply with the approved Outline Plan.

1.8.4 Public Consultation

The Copperwood Outline Plan was available for viewing at an Open House in the Arena Lobby of the Nicholas Sheran Leisure Center on Tuesday July 5, 2005. The Open House was held between 5:00 and 8:00 P.M. and staff from Daytona, AECOM and the City of Lethbridge were available to answer questions.

A mail out had been sent to adjacent homeowners and an advertisement was placed in the Lethbridge Herald two weeks prior to the Open House to notify the general public.

No written comments were received and the verbal comments were generally favourable. Questions and comments related more to the Area Structure Plan than the Outline Plan. No negative comments were made about the Outline Plan. Some questions were raised about the form and character of proposed multiple family land uses; as a result, the densities were reduced from R-150 & R-100 to R-75.

2. Site Conditions

2.1 Site Features

Topography for the plan area consists of gently rolling terrain with some small, scattered hills. The general area has slopes ranging up to 4%, with some slopes up to 10% on the steepest of the small hills. Elevations range from a high point of approximately 940.5 m above sea level, on a hill in the western plan area, to a low point of approximately 932 m in the southeast. The difference in elevation between the high and low areas is approximately 8.5 m (**Figure 3**).

The subsurface soils within the area are generally characterised as being comprised of organic topsoil, glaciolacustrine clays, glacial clay till, and bedrock.

2.1.1 Existing Site Features

The Copperwood site has no substantial treed areas, and contains no significant water bodies or natural drainage courses.

No buildings exist on the lands, and the lands are currently used for crops.

Copperwood contains portions of two existing government road allowances, now owned by the City. 24th Avenue West crosses east west though the middle of the plan area and 25 Street West runs north-south and clips the eastern portion of the plan area. These roadways will be closed and reclaimed to facilitate future development as contemplated by this Plan.

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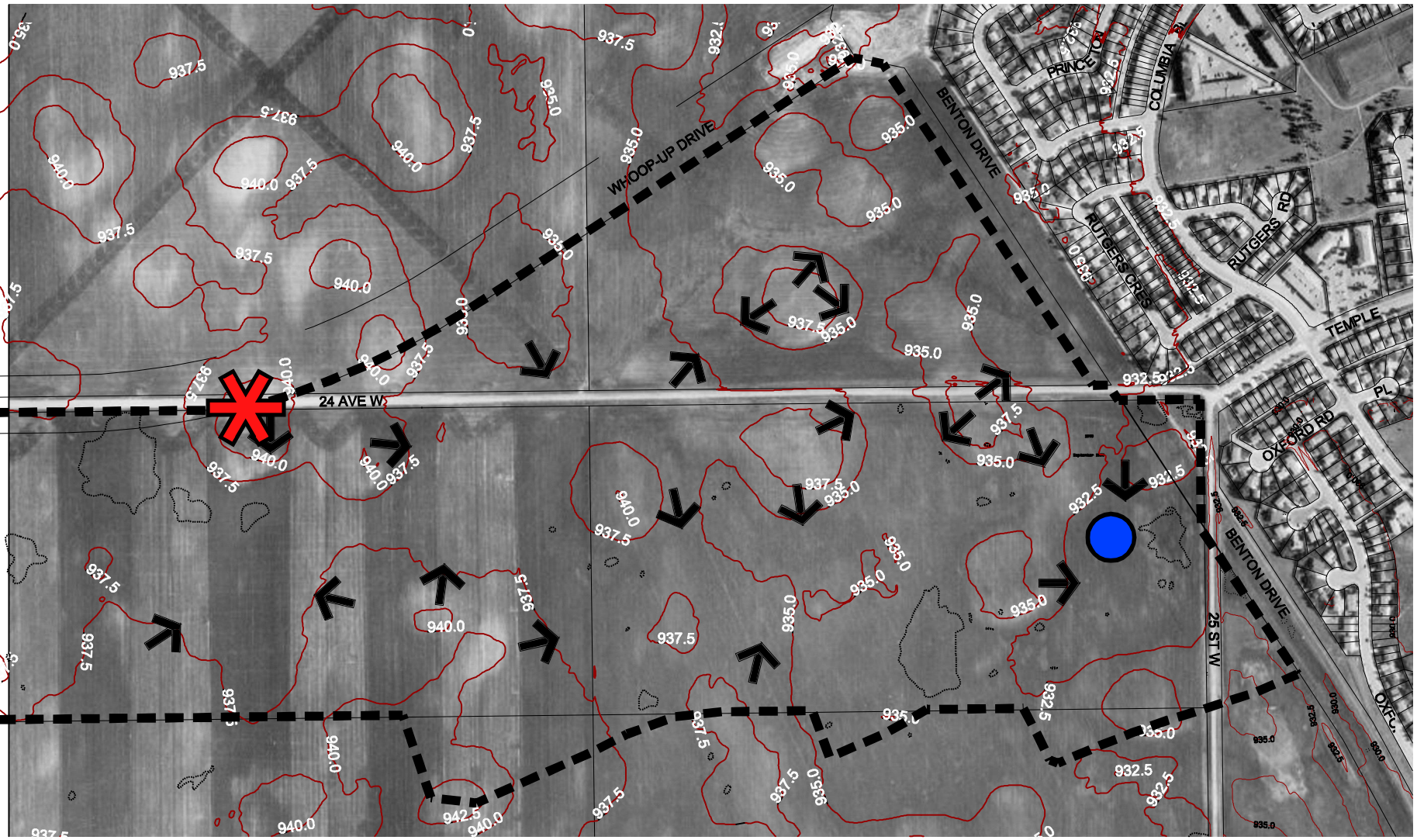

LEGEND

- COPPERWOOD OUTLINE PLAN BOUNDARY
- 935.0 CADASTRAL CONTOURS
- DRAINAGE DIRECTION
- HIGH ELEVATION
- LOW ELEVATION

N

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0 75 150 m SCALE 1:750(

Daytona Urban Development Corp
Copperwood, West lethbridge
Outline Plan

Site Conditions

Figure - 3

3. Planning Concept

3.1 Development Objectives

The goal of the Copperwood Outline Plan is to establish a framework for an attractive, liveable and diverse residential neighbourhood which complements and enhances the greater community. Its development has been guided by the following key objectives:

- to provide a range and variety of affordable and attractive housing to various demographics to meet current and future market conditions
- to provide a safe and convenient internal roadway system that directs traffic to Whoop-Up Drive and Benton Drive and links efficiently with future area transportation and circulation systems and planning
- to achieve orderly and economical servicing which responds to existing site conditions and logical staging
- to create a variety of pedestrian opportunities that enhance the walking experience
- to develop an integrated open space system with linkages to the Regional Trail system.

3.2 Development Concept

3.2.1 The Development Concept

Copperwood will provide for a mix and diversity in residential form and character. It will provide an opportunity to integrate a range of residential housing options in a Master Planned suburban setting. It will offer a spectrum of housing types from conventional single and semi detached housing, townhousing, multiplexes and apartment style housing. This full spectrum of housing will be able to satisfy the needs of a variety of lifestyles and family compositions. It will provide housing for younger and older market segments and families. **(Figure 4)**

The hierarchy of roadways and the variety of parks and open space elements of Copperwood define development modules. The intensification of residential land uses proposed in the western Plan area with access to the future school site could create a compact “village” atmosphere in that area. The park area to the west provides active play area for these land uses.

A large park area in the central Plan will provide a vista into the community from both Whoop-Up and Benton Drive. This park will provide opportunities for active and passive recreation and will become a focus for the community. The park will also perform a dry pond/stormwater management function.

The stormwater management facility designated in the east Plan area will serve both a functional and aesthetic purpose. Pedestrian links created through the neighbourhood will connect these open space elements. In addition, a dedicated walkway system is proposed through the south central Plan area. This walkway system provides links to the future school site to the west, the stormwater management facility to the east and a walkway link to the south neighbourhood. The open space elements will create a strong sense of place within the community and provide opportunities to develop landmarks in the neighbourhood.

The primary access south into Copperwood from Whoop-Up Drive passes through a landscaped roundabout and culminates in a T intersection in the heart of the community on the collector alignment. This collector alignment will continue on through the entire neighbourhood and eventually form the “south village” loop. The collector and entry roads will be developed to the City of Lethbridge Standards. Roadway cross-sections that enhance boulevard landscaping will be investigated with the City of Lethbridge. This will reinforce the community’s commitment to pedestrian activities and the popularity of walking and cycling for all age groups.

A 1.73 ha site west of the entrance to the neighbourhood south of Whoop-Up Drive is currently slated for a religious assembly site.

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LEGEND

- COPPERWOOD OUTLINE PLAN BOUNDARY
- LOW DENSITY
- MEDIUM DENSITY (R-37)
- MEDIUM DENSITY (R-75)
- PARK/ DRY POND/ SCHOOL
- STORMWATER MANAGEMENT FACILITY
- INSTITUTIONAL
- ROUNDABOUT

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0 75 150 m SCALE 1:75

Daytona Urban Development Corp
Copperwood, West Lethbridge
Outline Plan

Development Concept

Figure - 4

3.2.2 Residential Land Uses

The Land Use Concept shows a series of identifiable residential nodes or modules defined by the roadway and open space system. Residential land use will be developed to provide a range of low and medium density style housing uses and may include single-detached, semi-detached, townhouses, and multiplexes.

The format will facilitate a logical staging sequence and will provide opportunities for a range of housing to meet the needs of various target market groups including “move-up” and “move-down” buyers, first time home owners, active adult and the elderly.

Architectural guidelines will create distinctive identities and character for individual modules within the overall neighbourhood plan and result in a unified neighbourhood theme.

The Land Use Concept designates three categories of residential land uses and the districting plan contains four. For purposes of this Outline Plan the two low density uses are combined. **(See Figure 5)**

3.2.3 Low Density Residential

The low density residential component will include a compatible mix of lane and laneless modules. Lanes may be utilized to facilitate rear access, decrease on-street parking and limit direct driveway access to roadways.

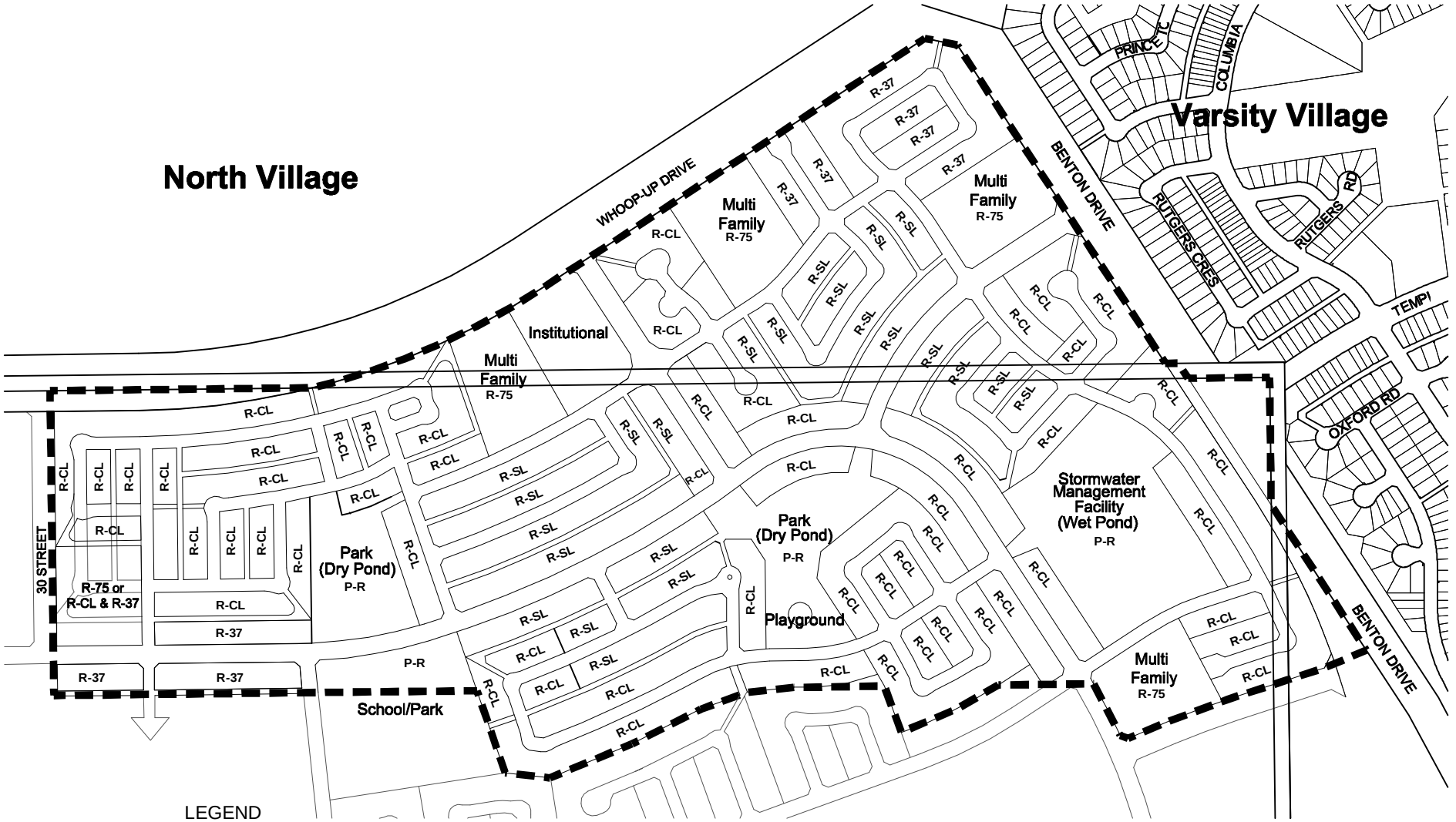
The low density residential will be developed with single-detached housing units at a density up to 21upha (8.5 upac). The majority of the low density residential area will conform to the existing R-SL, Small Parcel Low Density Residential district. All R-SL housing incorporates a rear lane.

A portion of the low density residential will be redistricted to R-CL. The R-CL district provides for a smaller, more cost effective product and also creates an alternative housing choice in the marketplace. This district will generally be utilized for lots backing onto major thoroughfares, but will also be used in other select areas, such as backing onto parks and stormwater management facilities and other areas where lane and laneless lots can be attractively developed.

Copperwood will utilize architectural controls to ensure a high quality, residential subdivision. Housing units with similar elevations will be interspersed and not located adjacent to one another. The height, form and color of each house will be compatible with houses on adjacent lots. Differentiation will also be achieved by encouraging a variety of exterior finishes and shingle alternatives. A pleasing streetscape will be promoted through various controls to prevent broad expanses of blank facades by encouraging the use of windows and architectural modeling rather than a flat façade. High visibility lots, including corner lots, will have higher architectural controls to ensure that flankage of these houses is acceptable.

Low density residential comprises approximately 47.4% percent of the gross developable area and represents 77% of the total residential area.

The provision of innovative and affordable housing is an objective of the Copperwood Plan. Achievement of this objective may require unique and cost effective servicing provisions and modified road cross-sections. Any variations to City of Lethbridge standards would require approval from appropriate agencies and departments.



LEGEND

- COPPERWOOD OUTLINE PLAN BOUNDARY
- R-CL COMPREHENSIVE PLANNED LOW DENSITY RESIDENTIAL
- R-SL SMALL PARCEL LOW DENSITY RESIDENTIAL
- R- 37 MEDIUM DENSITY RESIDENTIAL
- R-75 MEDIUM DENSTIY RESIDENTIAL
- P-R PARK AND RECREATION

0 75 150

Daytona Urban Development Corp
Copperwood, West Lethbridge
Outline Plan

Districting Plan

Figure - 5

3.2.4 Medium Density Residential

To accommodate a variety of market segments two types of medium density sites are proposed. Medium density sites are designated for multiple unit dwellings and may take the form of duplexes, townhouses, multiplexes and apartments. Medium density sites could include units for singles, families, active adults and seniors. Proximity to amenity areas and access to collector and arterial roadways have influenced the location of medium density sites.

3.2.5 R-37 – Medium Density Residential

Two sites are designated for R-37, medium density residential land use: They serve as a transition between the major collector road and lower density uses.

- A 3.74 hectare medium density site is located south of the Whoop Up and west of Benton Drive intersection. The site contains a crescent and a hammerhead cul-de-sac.
- The other site is located at the west end and on each side of Coalbanks Blvd W in the vicinity of the future school site. This site is approximately 1.70 ha and is located in the west Plan area. It serves as a transition between the community and potentially, a higher density multi-family site (swing site). The more diverse and compact module created in the west Plan area by this combination is well serviced by easy access to the future school and to the dry pond area which will also serve as a park. The module also has safe and convenient access to the super collector and Whoop-Up Drive.

Although the R-37 sites may be developed as duplexes, townhouses, multiplexes or apartments with a maximum density of up to 37 units per hectare, they will generally be developed with semi detached or two unit dwellings. Medium density residential comprises approximately 5.6% of the gross developable area and represents 9% of the total residential area.

3.2.6 R-75 – Medium Density Residential

Four and potentially a fifth site will be designated under an R-75 – Medium Density Residential district. Although the R-75 sites may be developed as townhouses, multiplexes or apartments with a maximum density up to 75 units per hectare, they will generally be developed as townhouses and multiplexes with a maximum height of 3.5 storeys.

Incorporation of appropriate architectural detailing will be encouraged to ensure medium density development is complementary to and compatible with surrounding residential development. Particular attention will be paid to address transitions between land uses.

Medium density(R-75) comprises approximately 9% of the gross developable area and represents approximately 14% of the total residential area.

The medium density “Swing-site” identified in **Figure 4** will be designated as either a medium density (R-75) site or have additional single family incorporated into this area. Should it be decided that the Swing-site incorporate single family, the southern block shadowed within the Swing-site would be zoned medium density (R-37) in order to create consistency with the surrounding medium density lots.

3.2.7 Institutional

A 1.73 ha site south of Whoop-Up Drive is identified for religious assembly use. It is located at a major entrance to the development and is supported with a walkable trail system and safe and convenient access.

3.2.8 Parks, Open Space and Walkways

The parks and open space system is a fundamental design element in Copperwood. It consists of a stormwater pond, complementary pathway linkages and a portion of the school site. It is designed to create interesting views

and diverse pedestrian experiences within the neighbourhood and provide links to adjacent neighbourhoods and regional trails on a combination of municipal reserve, public utility lots, on-street sidewalks and dedicated walkway links

The 1.13 hectare portion of school site designated in the south central Copperwood Plan area is part of a greater school site designated by the West Lethbridge Phase II Area Structure Plan.

A 4.37 ha stormwater management facility in the east Plan area will be a major visual and functional amenity within the neighbourhood. The shape, form and location of the stormwater system are intended to take full advantage of the existing topography. A walkway link is provided north from the stormwater facility to connect to the super-collector. The design provides interest and maximizes opportunities for walkout lots on the park. The stormwater facility promotes principles of sustainable design. The terraced open space creates opportunities for planting at multiple levels. LNID irrigation water will be used to maintain a constant water level in the stormwater wet pond. LNID has provided an email indicating that irrigation water will be available for the Copperwood SWMF; this is attached in **Appendix E**.

A 2.00 ha park in the west Plan area serves a stormwater management function but also provides an opportunity for active and passive recreation. A walkway link extending east from the facility provides a secondary access to the open space and serves as a culminating vista on Keystone Terrace West. Pedestrian and bicycle linkages will be encouraged within the neighbourhood as well as to the regional trail system. The open space and pathway/trail linkages plan is presented on **Figure 6**.

3.3 Transportation and Circulation

3.3.1 Access and External Roadway System

Copperwood's transportation system consists of a combination of super-collectors, major collectors, minor collectors and a series of local roads and lanes. A Super collector roadway from Whoop-Up Drive and a major collector roadway from Benton Drive provide the primary accesses to Copperwood. These access points are established by the approved West Lethbridge Phase II ASP. A shadow plan provided on **Figure 7** illustrates how Copperwood generally respects the South Village concept. The super-collectors, major collectors, minor collectors and the collector loop will accommodate transit. Roundabouts are proposed at the internal end of the Super Collector roadways off of Whoop-Up Drive and Benton Drive. Other key intersections within the development are planned as conventional intersections. A Traffic Impact Assessment (TIA) has been completed for Copperwood and the South Village. This document has been submitted under separate cover.

3.3.2 Internal Roadway System

The internal roadways for Copperwood are shown on **Figure 8** - Roadway Hierarchy. Local traffic from the residential modules is directed to the collector loop road before exiting the neighbourhood onto perimeter roads. Lanes will be utilized to facilitate rear access, decrease on-street parking and limit direct driveway access to roadways. The internal roadway network is estimated at approximately 24.2% percent of the gross developable area of Copperwood, or 22.47 hectares.

3.3.3 Transit Routes and Bus Stop Locations

The City of Lethbridge Transit was contacted regarding transit route and bus stop locations and the ultimate recommendations are shown on **Figure 9**.

Staged development routes can be accommodated on other Minor Collector roadways.

3.3.4 Canada Post

Canada Post typically sites their Community Mail Boxes beside the sidewalk on City right-of-way adjacent to the rear of the long frontage of corner lots and at entrances to parks and walkways.

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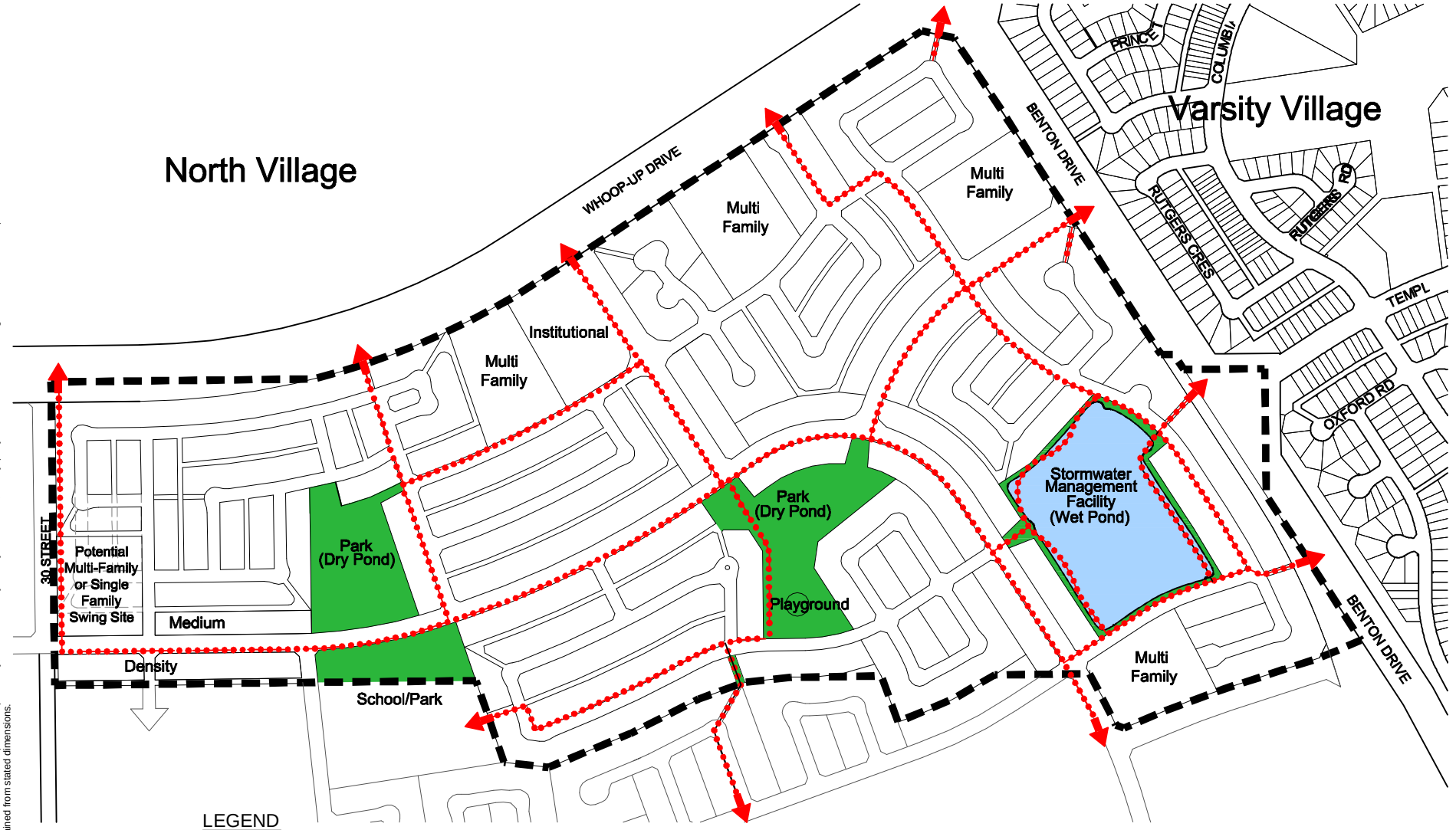

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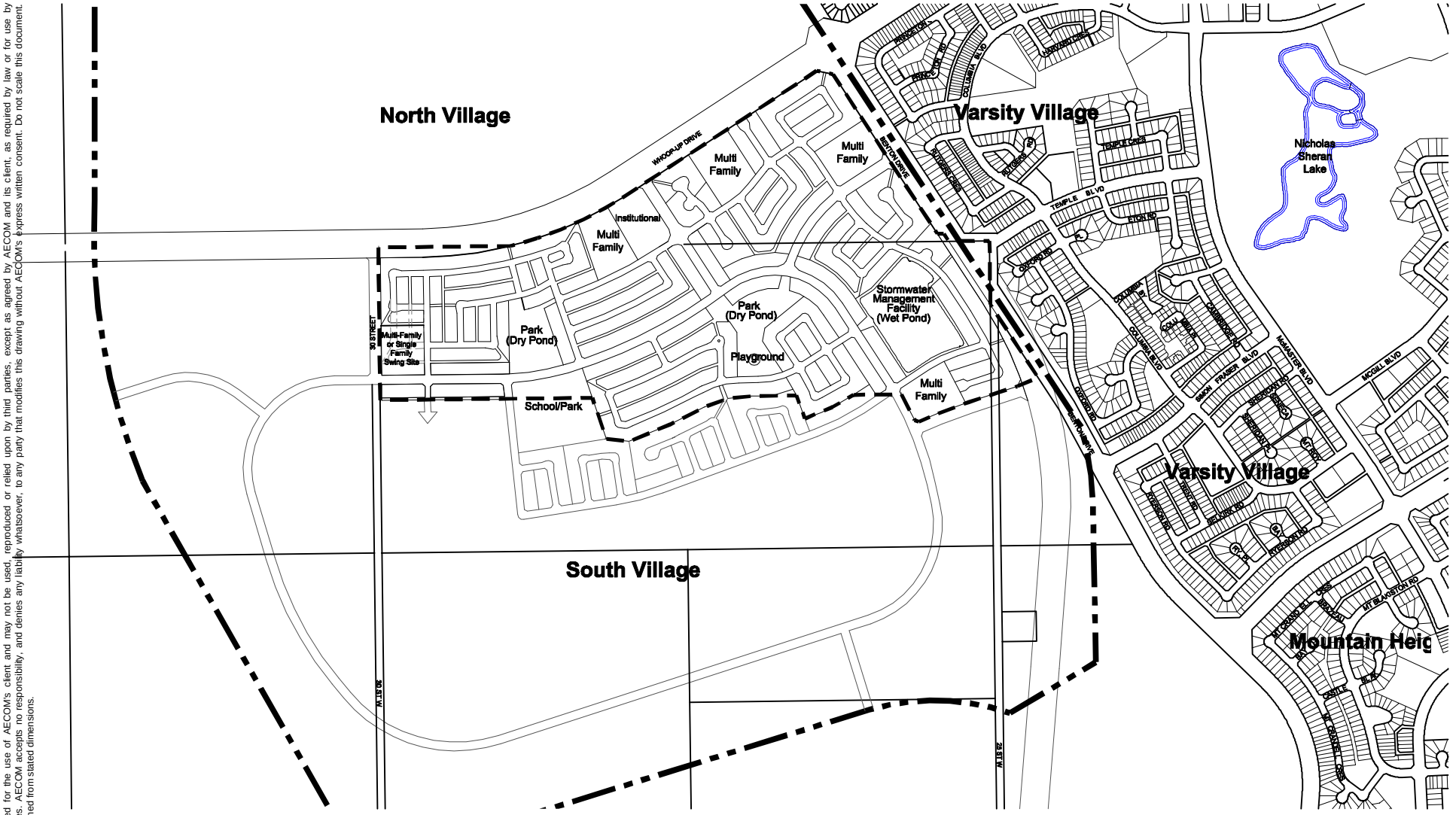
Daytona Urban Development Corp
Copperwood, West Lethbridge
Outline Plan

Open Space and Trails

Figure - 6



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- COPPERWOOD OUTLINE PLAN BOUNDARY
- WEST LETHBRIDGE PHASE II ASP BOUNDARY

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Daytona Urban Development Corp
Copperwood, West Lethbridge
Outline Plan

Shadow Plan

Figure - 7

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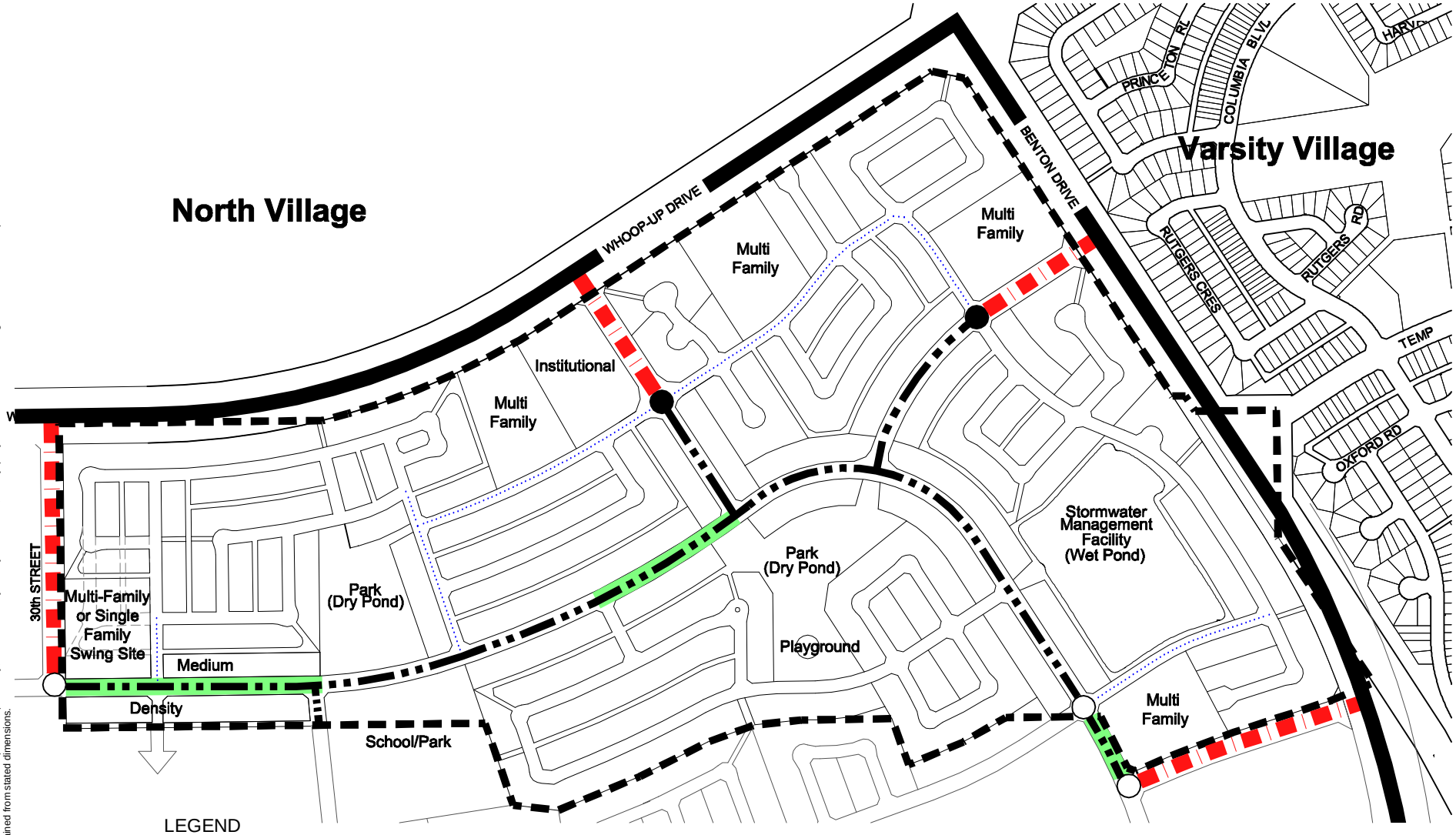

LEGEND

- COPPERWOOD OUTLINE PLAN BOUNDARY
- ARTERIAL
- SUPER COLLECTOR
- MAJOR COLLECTOR
- MINOR COLLECTOR
- ROUNDABOUT
- POTENTIAL FUTURE ROUNDABOUT
- NO FRONT DRIVEWAYS PERMITTED

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Daytona Urban Development Corp
Copperwood, West Lethbridge
Outline Plan

Road Heirarchy

Figure - 8

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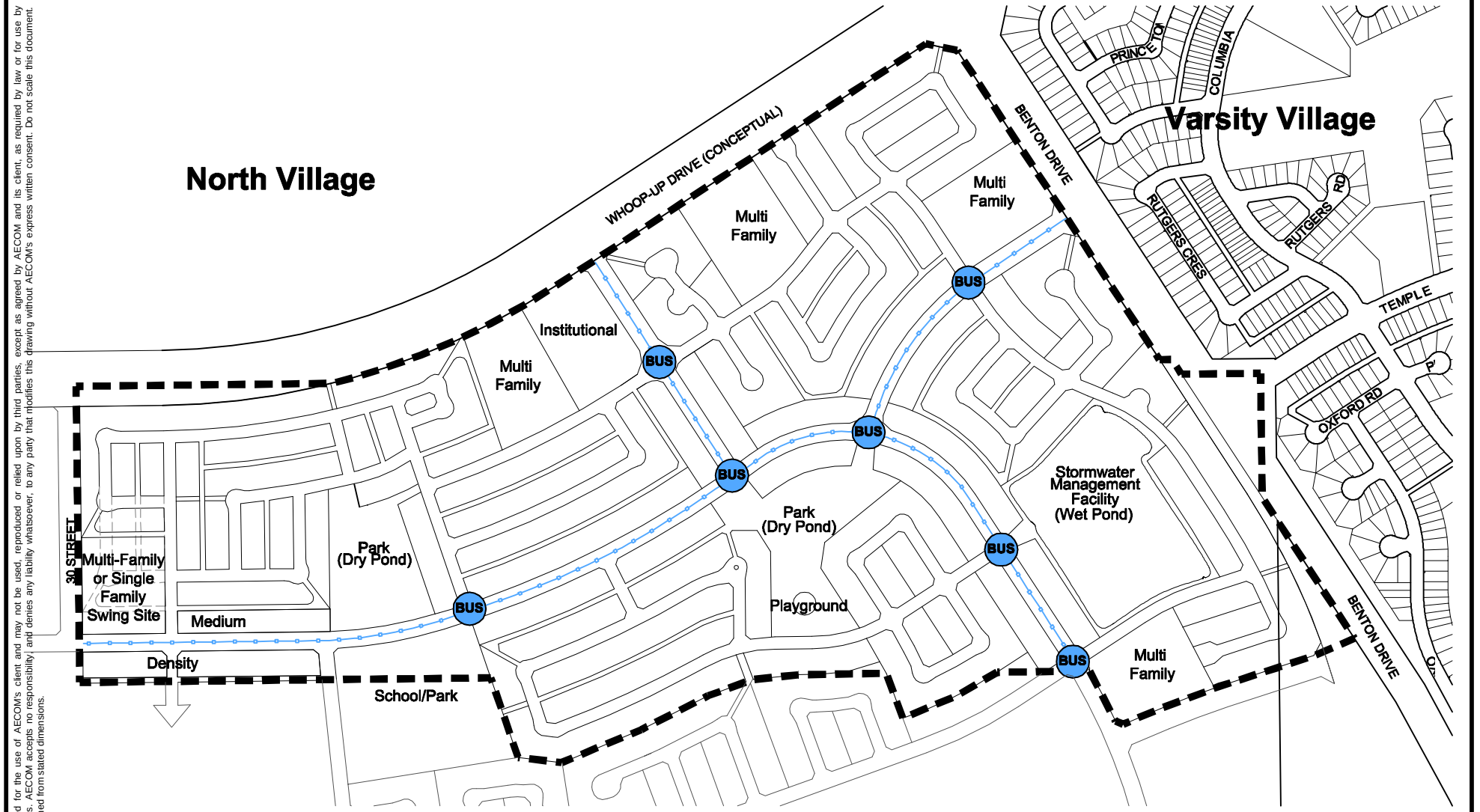

Daytona Urban Development Corp
Copperwood, West Lethbridge
Outline Plan

Transit Routes and Bus Stops

Figure - 9

4. Services

4.1 Water Supply and Distribution

The proposed water supply and distribution system for the Copperwood area closely follows that described in the West Lethbridge Phase II Area Structure Plan. The proposed water supply and distribution system is shown within the list of attachments under **Figure 11** of the Master Servicing Plan **(Appendix F).** The northwest land use revision figures can be found in **Appendix G**.

The source of supply for the Copperwood water distribution system will be a 400 mm diameter distribution main line along Whoop-Up Drive and an existing 400 mm diameter line in Benton Drive.

The West Lethbridge Phase II Area Structure Plan envisioned one 400 mm diameter main through the Copperwood area to service the development with three 400 mm diameter connections to the adjacent main lines in Whoop-Up Drive and Benton Drive. Additional 400 mm diameter connections to the adjacent main lines in Whoop-Up Drive, Benton Drive and Macleod Drive will provide supply for future development south and west of the Copperwood area. Further analysis of the distribution system within the Copperwood development and discussions with the City of Lethbridge Infrastructure Services identified that the 400 mm diameter lines could be replaced with 300 mm diameter distribution lines.

A portion of the 400 mm diameter main line in Benton Drive previously planned to provide supply for future developments to the south has been routed through the Copperwood area at the request of the City of Lethbridge. The remainder of the trunk lines and connections remain 300 mm diameter as described above.

With the exception of the 300 mm and 400 mm diameter main line and the three ultimate 300 mm diameter connections to the adjacent main lines, the distribution system for Copperwood consists of 200 mm diameter distribution lines.

An existing water main along 24th Avenue West provides service to Sunset Acres. With the development of Copperwood this line will be impacted. A temporary connection is proposed along the Future Whoop-Up Drive ROW to provide continued service to Sunset Acres and allow for the construction of the Copperwood development.

The water distribution network follows the roadway layout and has been sized to accommodate the more conservative of those levels of service set out in the City of Lethbridge Design Standards (2004) and the Standards and Guidelines For Municipal Waterworks, Wastewater and Storm Drainage Systems (AENV, 1997). The Copperwood area is predominantly residential with corresponding levels of service, as reviewed with the City of Lethbridge, including:

- Residential Average Day Demand of 415 Lpcd
- Residential Maximum Day Demand of 920 Lpcd (pro-rated)
- Residential Peak Hour Demand of 1460 Lpcd (pro-rated)
- Minimum pressure to each service connection of 310 kPa at peak hour demand
- Minimum pressure to each service connection of 345 kPa at maximum day demand
- Minimum pressure to each service connection of 150 kPa at maximum day demand during a fire flow of 75 L/s under Maximum Day Demand conditions.
- Maximum of 620 kPa to any service connection.

The proposed water distribution network was modelled using WaterCAD, with the Copperwood network added to the West Lethbridge model provided by the City of Lethbridge (2004 West Skeleton.wcd). This is a skeletonized model of the distribution network, with the demands for a particular zone distributed evenly among the pipe junctions within the corresponding zone. The integration of Copperwood with the existing network allowed analysis of both local effects as well as effects on the West Lethbridge distribution network. The accuracy of the results of the existing distribution network is limited by the completeness of the existing model. 2004 West Skeleton provides ADD, MDD,

PHD and MDD-Fire Flow scenarios for most of the existing water lines, but does not include Sun Ridge, North Village, South Village or full development of West Highlands, RiverStone and Paradise Canyon.

The elevation of the existing junction at the intersection of Whoop-Up Drive and Blackfoot Road in the West Lethbridge WaterCAD model was tied to the corresponding pipe design elevation (Stantec Consulting Ltd.). This provided consistency in evaluating pressure results for pipe both in the existing model and that proposed for the Copperwood area and will closely match the elevation of service connections located in basements.

The ADD, MDD, PHD and MDD-Fire Flow demands of the Copperwood zone (CPD) were based on a residential population of 5,275, corresponding to the current proposed development.

Model results are summarized graphically in **Appendix D**. The WaterCAD model and detailed results can be made available upon request. The results showed:

- At Average Day Demand, all levels of service were met on the distribution network with the exception of pressures exceeding 620 kPa for the lower portions of Paradise Canyon and Ridgewood Heights
- At Maximum Day Demand, all levels of service are met as above
- At Peak Hour Demand, pressures still exceeded 620 kPa for the lower portions of Paradise Canyon and minimum pressure requirements were not met at two junctions in the south central (highest) portion of Copperwood, at two junctions on Peigan Crt W and at one junction on Cowichan Crt W.
- At Maximum Day Demand with a 75 L/s Fire Flow, the Copperwood area met the required level of service
- At Maximum Day Demand with a 75 L/s Fire Flow, one junction on Concordia Pl W and one junction on Cambridge Road W were added to those already failing to satisfy fire flow constraints on the existing City of Lethbridge Model.
- Those already failing to satisfy fire flow constraints included:

a. One junction on Mohawk Rd W
b. Ryerson Rd W
c. The service to Atso Towawwa Park
d. Ryerson Pl W
e. The two easterly branches of Ojibwa Pl W
f. Ryerson Bay W
g. One junction on Princeton Rd W
h. Laurentian Pl W
i. One junction on Nevada Pl W
j. Laval Pl W
k. Two junctions on Temple Cres W
l. 2 junctions on Laval Rd W
m. All of Oxford Rd W
n. 2 junctions on Dalhousie Crt W
o. One junction on Eton Rd W
p. Mt Crandell Bay W
q. Loyola Pl W
r. Mt Blakiston Pl W
s. Trinity Pl W
t. Mt Blakiston Bay W
u. Sheridan Pl W
v. Mt Backus Pl W
w. Seneca Pl W
x. Mt Alderson Pl W

In analysing the model further, the critical path affecting the failure to meet the level of service for Peak Hour Demand in the south central (highest) portion of Copperwood was found to be the line running from the West Lethbridge Reservoir to Benton Drive. The velocity based on the existing 400 mm AC line is 1.97 m/s and has a headloss gradient of 20.83 m/km. These are high values for municipal water distribution networks. The minimum required upgrade to meet level of service requirements for Peak Hour Demand would be 500 mm PVC resulting in a velocity of 1.63 m/s and headloss gradient of 3.52 m/km.

Upsizing of the above noted main and/or a supply from a strategically located new reservoir are potential solutions to the shortage of water for the fire flow condition. System upgrades are recommended before the full build-out of Copperwood.

Water System phasing is described in Section 5. Item 5.3.

4.2 Sanitary Sewer Collection System

The proposed sanitary sewer collection system is defined under **Figure 12** of the Master Servicing Plan. This system closely resembles the conceptual sewer system as outlined in the "West Lethbridge Phase II Area Structure Plan". The following items identify the sanitary sewer design components that differ from the ASP:

- The projected population statistics and densities for Copperwood are higher than those of the ASP; subsequently, the sewage flow rates are higher than indicated in the ASP.

- **Area 400** which has been derived from the ASP Boundary's *Central Catchment Area 2* has not been included as part of the Copperwood Outline Plan's infrastructure. Subsequently, future development west of Copperwood will require a sanitary sewer trunk connection as shown on Figure 12. This particular servicing option was also identified by Stantec Consulting Ltd. as part of their sanitary sewage analysis for the Whoop-Up Drive Extension from May 2005.

The analysis, of the sanitary sewer flows for Copperwood, is presented on **Figure 13** of the Master Servicing Plan. This analysis utilizes flow rates as outlined in the City of Lethbridge Infrastructure Services Design Standards and, where applicable, Alberta Environment Guidelines. The derived values for population density are from the Land-Use Statistics in **Appendix B**. Conceptual grade line design information was used to establish catchment zones and together with the proposed land-use information design flows were determined for each catchment.

The analysis and design has yielded three distinct catchment zones that will discharge to the sanitary sewer trunk line that has been installed along Whoop Up Drive, and a third zone that will have to discharge to the south of Copperwood via a future sanitary sewer trunkline (refer to **Figure 12** of the Master Servicing Plan):

Master Servicing Plan figures can be found in **Appendix F**. The northwest land use revision figures can be found in **Appendix G**.

Catchment Area 100
- Contributes a peak flow of 66.9 L/s at full build-out.
- Discharges by gravity to the existing 525 mm sanitary sewer along Whoop-Up Drive.
- This catchment includes part of the Future "Area 107" as outlined in the "West Lethbridge Area Structure Plan". This area will likely have to connect into the Copperwood sanitary sewer system in the future because of the existing surface elevations. A population density has been extrapolated from the Copperwood Land-Use Statistics, **Appendix B**.

Catchment Area 200
- Contributes a peak flow of 19 L/s at full build-out
- Discharges by gravity to a 375 mm sanitary sewer along Benton Drive

Catchment Area 300
- Contributes a peak flow of 60 L/s at full build-out.
- Discharges by gravity to a future 300 mm sanitary sewer along Benton Drive.
- This catchment includes "Area 205" as outlined in the "West Lethbridge Area Structure Plan". This area will likely have to connect into the Copperwood sanitary sewer system in the future because of the existing surface elevations. A population density has been extrapolated from the Copperwood Land-Use Statistics **Appendix B**.

Catchment Area 400
- Future 6.25 ha will contribute to a future extension of the sanitary system that will be constructed along Whoop-Up Drive.

Catchment Area 500
- Contributes to a future sanitary system that will be constructed from the south.
- Estimated Flow will be 9 L/s.

Whoop-Up Drive Analysis

Our analysis of the existing capacity of the sanitary sewer trunk installed along Whoop-Up Drive has yielded the results presented on **Figure 13: Whoop Up-Drive Analysis***.* This table shows that, when the estimated sewage generation rates from North Village and Copperwood are combined at key points on Whoop-Up Drive trunk, the installed pipe capacities are not exceeded. The City of Lethbridge approved flow rate from the Copperwood development to the Whoop-Up Drive trunk sewer is 134 L/s.

Sanitary sewer system phasing is addressed in Section 5.3 of the Outline Plan.

4.3 Stormwater Management System

The proposed stormwater management system for the Copperwood area generally follows that described in the West Lethbridge Phase II Area Structure Plan. The major variances from the ASP include:

- The catchment areas have been developed based on existing ground elevations, the proposed development plan and conceptual design grades, resulting in some variance in the areas.
- The boundaries have been adjusted to match the design topography and proposed layout for the Outline Plan area. The south catchment boundary has been shifted north to match a high point indicated by the topographical survey.
- There are three SWMF proposed for the Copperwood area, compared to two indicated in the ASP. Three ponds have been utilized to efficiently control and store the storm water runoff and allow for staging of the development area.

The proposed stormwater management system is shown on **Figure 14** of the Master Servicing Plan. Storm drainage catchment areas for the Copperwood area were determined based on the natural topography and the proposed pattern of development.

The stormwater management system for the Copperwood area is independent of the systems in the area east of Benton Drive, the areas north of Whoop-Up Drive and the area south of Copperwood. No overland drainage will be directed into the Copperwood development from Whoop-Up Drive or the area south of Copperwood. The area south of Copperwood will require its own overland flow route to ensure storm water runoff reaches SWMF #7 or SWMF #8 as shown in the ASP.

The minor storm runoff from Benton Drive within area C28 can be accommodated within the pond in Copperwood. The overland flow from this area will be conveyed south along Benton Drive.

For stormwater purposes, there will be no discharge of stormwater offsite for the 1:100 year design storm. Flow will only be released when telemetry readings from the Simon Fraser Trunk Sewer allow it to do so. The outfall pipe from the Copperwood wet pond will be extended to an existing manhole located 128m north of the intersection of Benton Drive and Simon Fraser Boulevard. The telemetry station will be set up in the manhole at the junction of McMaster Boulevard and McGill Boulevard. The actual method of monitoring and the design discharge rate will be determined at the detailed design stage.

Post development flows for the minor system (1 in 5 year rainfall) will be developed as part of the detailed design stage using the Rational Method using parameters specified in the City's Infrastructure Design Standards. Minor system subcatchments are identified on **Figure 14** of the Master Servicing Plan. Minor system flows are shown on **Figure 15** and **16**.

The Copperwood stormwater management system will provide complete storage for a 1 in 100 year event.

SWMHYMO and QHM were used to determine required storage volumes for the three stormwater management facilities. The City of Lethbridge 1 in 100 year 24 hour design storm was used for all storage and hydrograph modeling. The SWMHYMO modeling parameters used are summarized in **Table 4-1.**

Table 4-1 - Modelling Parameters (Catchment Specific)

Catchment Area	Area	Slope	Percent Impervious
	ha	*%*	*%*
A	26.67	0.3	53
B	24.92	1.0	50
C	61.40	0.8	54

The storage volume for each catchment required to limit discharge from the wet pond to 230 L/s/ha, is shown in **Table 4-2**.

Table 4-2 - Pond Volumes Interim (230 L/s/ha release)

Catchment Area	Area	Permanent Storage Volume	Storage Volume (below FB)
	ha	m^3	m^3
A	17.39	0	12,678
B	19.17	0	12,572
C	76.43	31,539	83,053
Total	***112.99**	**31,539**	****106,823**

***** This area accounts for 94.71 ha within the Copperwood Outline Plan Boundary and 18.28 ha outside the Copperwood Boundary.

** This volume meets the 1 in 100 year rainfall event storage requirement with zero discharge.

Ponds A and B will be dry ponds which will provide staged storage for ultimate discharge into the Wet Pond C. The Wet Pond will provide additional storage and treatment to meet water quality objectives. The following tables give a more detailed description of the storm ponds.

The preliminary design details of the three ponds are shown in **Tables 4-3, 4-4** and **4-5**. The layout of the ponds has been based on a 6 m offset from any adjacent property line to the top of the pond slope excavation. This meets the City Parks requirement of 9m between the adjacent property line and the Pond HWL. Pond side slopes have been designed in accordance with Alberta Environment and the City of Lethbridge Standards.

Pipe sizes and slopes may be revised during the design stage to minimize the depth of bury on storm pipes and the depth of the ponds.

Table 4-3 - Pond A Details

Parameter	Pond
Maximum pond depth (HWL)	1.500 m
Maximum pond storage (HWL)	12,678 m^3
Freeboard (above HWL)	0.60 m
Maximum Developable Area	17.39 ha

Table 4-4 - Pond B Details

Parameter	Pond
Maximum pond depth (HWL)	1.500 m
Maximum pond storage (HWL)	12,572 m^3
Freeboard (above HWL)	0.60 m
Maximum Developable Area	19.17 ha

Table 4-5 - Pond C Details (including forebay)

Parameter	Pond (230 L/s/ha release)
Permanent pool volume	31,539 m^3
Active storage volume (below FB)	83,053 m^3
Maximum discharge rate (HWL)	0.230 m^3/s
1:100 year pond depth*	5.0 m (3m PP+2m)
1:5 year pond depth*	3.489 m
Maximum depth of permanent pool	3.000 m
Maximum Developable Area	76.43 ha

* includes the 3.0 m of permanent storage.

The release rate from the dry ponds will be restricted to maximize storage in the upstream ponds. The restricted release rate will allow for longer detention time and require less downstream storage in the wet pond.

When Stormwater in Pond A exceeds the HWL it will overtop a weir and be piped to Pond B. When Stormwater in Pond B exceeds HWL it will overtop a weir and be piped to Pond C.

The proposed outfall for the wet pond (Pond C) will connect to the existing system at Simon Fraser Blvd. A gate structure will be required to control the release of runoff from the wet pond (Pond C).

Major overland and emergency overland flow routes for the three proposed stormwater management facilities are shown on **Figure 17** of the Master Servicing Plan. The major overland flow route is designed to convey runoff from storm events up to and including the 1 in 100 year storm without flooding onto private property. The emergency overland flow route is designed for storms greater than the 1 in 100 year event.

Supplemental irrigation water to keep the wet pond at a constant level will be available from the LNID canal north of the site. The system will require a pump and force main to convey the irrigation water to the wet pond.

Section 5.3 addresses the phasing of deep utilities within the Copperwood Outline Plan area.

Master Servicing Plan figures can be found in **Appendix F**. The northwest land use revision figures can be found in **Appendix G**.

4.4 Shallow Utilities

In consultation with the respective utility companies, shallow utilities, including electrical services, telephone and cable required to service the Copperwood neighbourhood will be extended into the Outline Plan area from the

existing infrastructure. Preliminary discussions with the City Electric Department to develop a phasing strategy for the overhead power line across the property have been initiated.

4.5 Fire Protection

The provision of adequate fire protection is important to the safety and security of all City neighbourhoods and residents. The Copperwood neighbourhood has been designed to meet all of the required standards and guidelines for development of this nature. Roads have been designed, and are of sufficient width, to allow for safe and convenient access for all emergency vehicles. In addition, fire flow requirements of 75 L/s under maximum day demand conditions with a minimum pressure of 150 kPa (21.7 psi) have been met.

Current fire protection needs for West Lethbridge are met by the #2 Fire Hall located at 10 Jerry Potts Boulevard West. Tests conducted by the City of Lethbridge Fire Department indicate less than four minute response times to the neighbourhood.

4.6 Geotechnical

A geotechnical investigation is underway and will be submitted to the City of Lethbridge under separate cover once it's complete.

4.7 Environment

The lands on which Copperwood will be built have been cultivated agricultural land for many years and as such an environmental assessment is not deemed necessary.

5. Implementation

5.1 Subdivision and Development Process

Following adoption of the Outline Plan, implementation of the plan will be on a stage-by-stage basis achieved through the City's redistricting and subdivision processes.

5.2 Development Staging

Seven stages of development are proposed for Copperwood. Stage 1 development will begin in the spring of 2006. Proposed subdivision staging is shown on **Figure 10a**.

5.3 Deep Utility Development

It is anticipated that development of the deep utilities in the Copperwood Area will begin in Phase 1 as shown on **Figures 10a and 10b**. Generally, development will build outward from the initial Stage in Phase 1 in an east, west and southerly direction. This will ensure the development proceeds in line with the orderly and economic provision of municipal services, and in response to market demand. It is also possible that development may begin and occur simultaneously in Phase 2 and Phase 3 before the full build out of Phase 1. There is a secondary potential for development to begin adjacent to Benton Drive in Phase 3 and proceed west before linking with the services in Phase 1.

Phase 1 of the deep utility development requires a sanitary sewer and water connection to Whoop-Up Drive in the north. We have confirmed all of Phase 1 & 2 can be serviced by the single water connection off Whoop-Up Drive. This single connection can meet the required fire flows for both Phase 1 & 2. Phase 1 will require the construction of storm Pond B. We have determined that approximately 19.17ha of Phase 1 can be serviced by Pond B. Development beyond this area will require the partial construction of Pond C or other temporary measures to control the additional storm runoff.

Phase 2 of the deep utility development requires an internal sanitary sewer and water connection to Phase 1. Phase 2 will also require the construction of Pond A. We have determined that 17.39 ha of Phase 2 can be serviced by the Pond A. Development beyond this area will require the partial construction of Pond C or other temporary measures to control the additional storm runoff.

Phase 3 of the deep utility development requires the sanitary sewer and water connection to Benton Drive. The water system will ultimately be connected to the system in Phase 1 which will provide the ultimate looped connection for the development. Phase 3 will also require the construction of Pond C. Pond C has been sized to handle the excess runoff from Pond A, Pond B and the runoff from Catchment C. Therefore construction of Pond C would allow for full development of the Copperwood Neighborhood.

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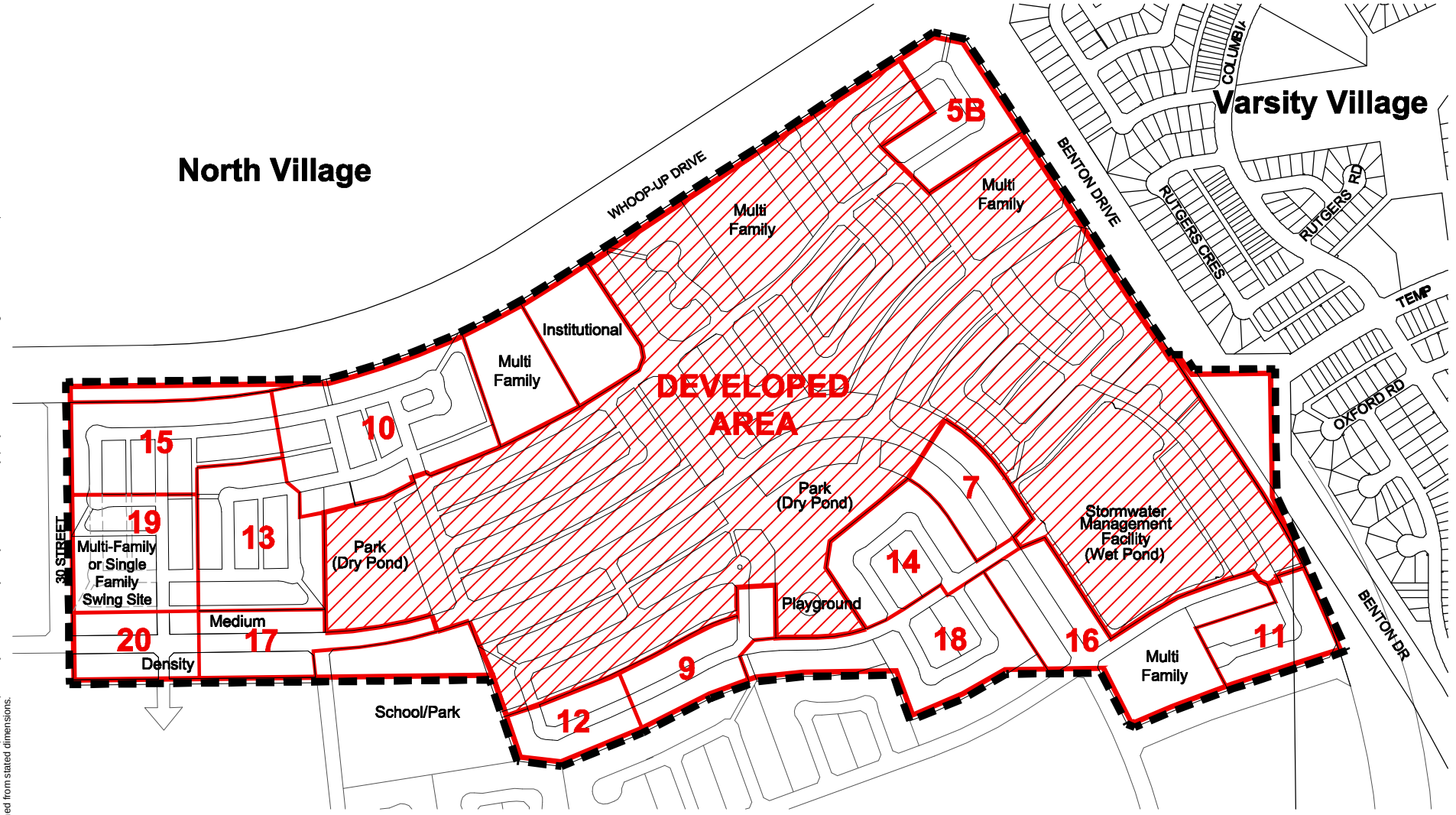

LEGEND

COPPERWOOD OUTLINE PLAN BOUNDARY

STAGING BOUNDARY

AECOM

0 75 150 m SCALE 1:7500

Daytona Urban Development Corp
Copperwood, West Lethbridge
Outline Plan

Staging Plan

Figure - 10A

ISS/REV: B
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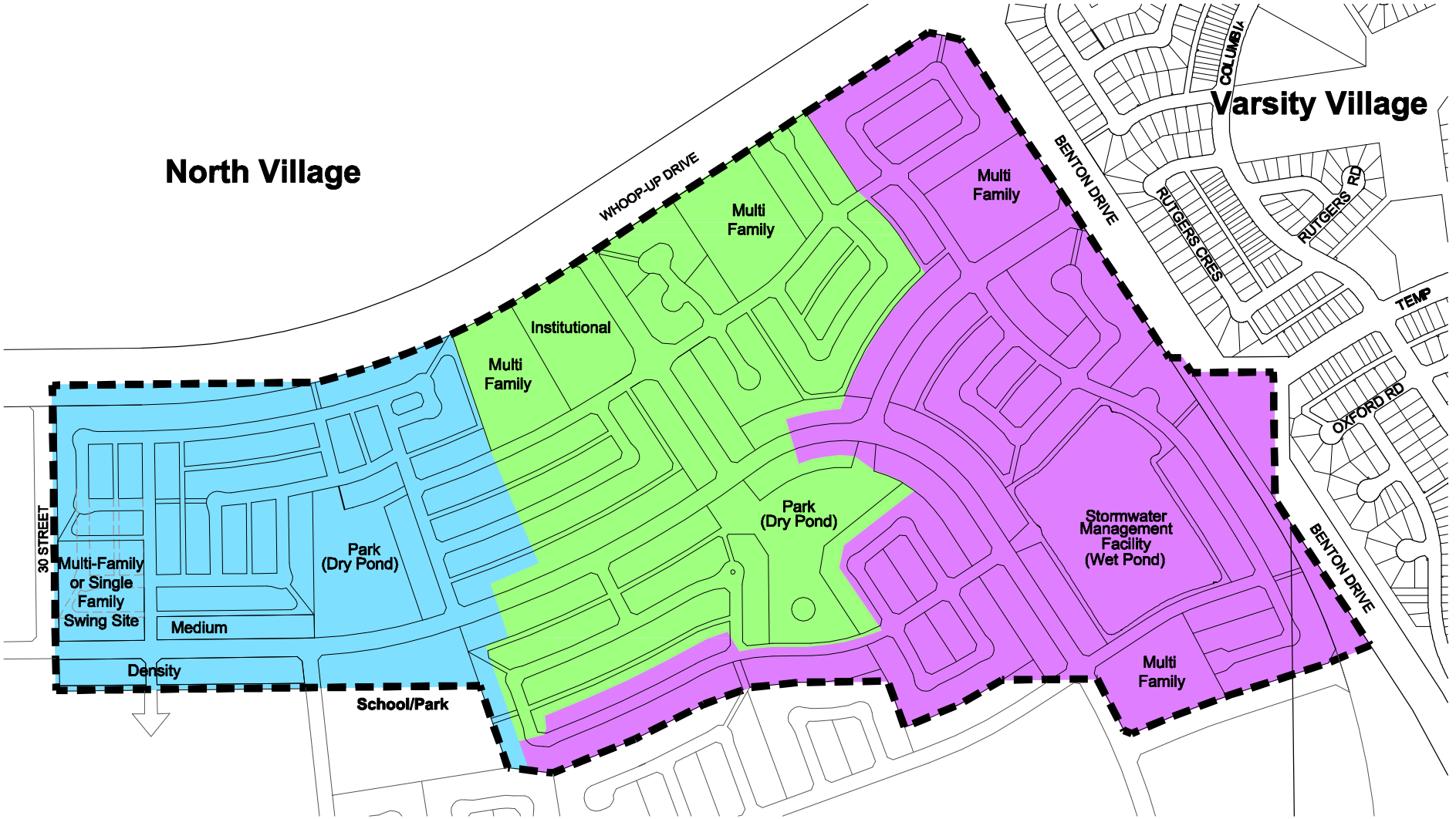


LEGEND

- COPPERWOOD OUTLINE PLAN BOUNDARY
- UNDERGROUND UTILITIES PHASE 1
- UNDERGROUND UTILITIES PHASE 2
- UNDERGROUND UTILITIES PHASE 3

0 75 150 m SCALE 1:7500

AECOM

Daytona Urban Development Corp
Copperwood, West Lethbridge
Outline Plan

Underground Utilities Phasing Plan

Figure - 10B

Appendix A
Certificate of Title

05-8176

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0031 114 656	0512143;1;1	051 226 360

LEGAL DESCRIPTION
PLAN 0512143
BLOCK 1
LOT 1
EXCEPTING THEREOUT ALL MINES AND MINERALS
AREA: 32.393 HECTARES (80.04 ACRES) MORE OR LESS

ESTATE: FEE SIMPLE
ATS REFERENCE: 4;22;8;22;NW

MUNICIPALITY: CITY OF LETHBRIDGE

REFERENCE NUMBER: 051 213 774

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
051 226 360	25/06/2005	TRANSFER OF LAND	$1,080,000	$1,080,000

OWNERS

DAYTONA URBAN DEVELOPMENT CORP..
OF 100, 10423 178 ST
EDMONTON
ALBERTA T5S 1R5

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
741 091 031	27/09/1974	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
051 213 776	16/06/2005	CAVEAT RE : DEFERRED RESERVE CAVEATOR - THE CITY OF LETHBRIDGE. 910 - 4TH AVE. SOUTH, LETHBRIDGE ALBERTA
051 226 361	25/06/2005	MORTGAGE MORTGAGEE - B2B TRUST. STE 404, 130 ADELAIDE ST WEST TORONTO ONTARIO M5H3P5 MORTGAGEE - BRENDA SONNTAG 714 BROOKHURST LANE SASKATOON SASKATCHEWAN S7V1G1 MORTGAGEE - BRUCE DIKA 19904 111 AVE EDMONTON ALBERTA T5S2N1 MORTGAGEE - DAYTONA URBAN DEVELOPMENT CORP.. 100, 10423 178 ST EDMONTON ALBERTA T5S1R5 ORIGINAL PRINCIPAL AMOUNT: $3,560,000 SEE INSTRUMENT FOR MORTGAGEE AMOUNTS
051 244 877	11/07/2005	POWER OF ATTORNEY GRANTOR - BRENDA SONNTAG GRANTOR - BRUCE DIKA ATTORNEY - DAYTONA URBAN DEVELOPMENT CORP.. SUITE 100, 10423 - 178 STREET EDMONTON ALBERTA T5S1R5 AFFECTS INSTRUMENT: 051226361 RESTRICTED
051 262 700	22/07/2005	MORTGAGE MORTGAGEE - HSBC BANK CANADA. 10250-101 ST EDMONTON ALBERTA T5J3P4 ORIGINAL PRINCIPAL AMOUNT: $1,770,000
051 291 944	12/08/2005	POSTPONEMENT OF MORT 051226361 TO MORT 051262700

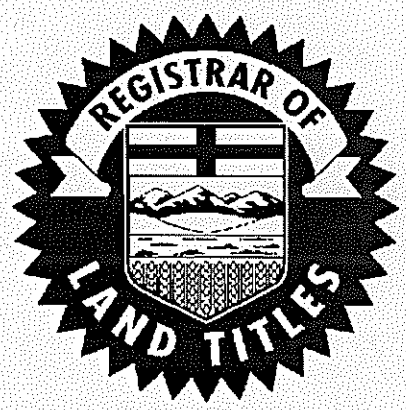
(CONTINUED)

TOTAL INSTRUMENTS: 006

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 7 DAY OF FEBRUARY, 2006 AT 11:16 A.M.

ORDER NUMBER:4551397

CUSTOMER FILE NUMBER: 05-8176



END OF CERTIFICATE

05-8176

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0031 120 595	0512218;1;2	051 220 164

LEGAL DESCRIPTION
PLAN 0512218
BLOCK 1
LOT 2
EXCEPTING THEREOUT ALL MINES AND MINERALS
AREA: 32.374 HECTARES (80 ACRES) MORE OR LESS

ESTATE: FEE SIMPLE
ATS REFERENCE: 4;22;8;22;NE

MUNICIPALITY: CITY OF LETHBRIDGE

REFERENCE NUMBER: 011 367 124

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
051 220 164	21/06/2005	SUBDIVISION PLAN		

OWNERS

SERDNA FARMS LTD..
OF 2213-24 AVENUE
COALDALE
ALBERTA T1M 1G8

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
741 091 031	27/09/1974	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
751 004 557	17/01/1975	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED.
041 479 994	20/12/2004	CAVEAT RE : PURCHASE AGREEMENT CAVEATOR - DAYTONA LAND CORP.. 404, 10216-124 ST EDMONTON ALBERTA T5N4A3 AGENT - WAYNE R LOVATT
051 030 315	24/01/2005	CAVEAT RE : RIGHT OF FIRST REFUSAL CAVEATOR - DAYTONA LAND CORP.. C/O LOVATT OLSEN 404, 10216-124 ST EDMONTON ALBERTA T5N4A3 AGENT - PETER R SEMONICK
051 220 166	21/06/2005	CAVEAT RE : DEFERRED RESERVE CAVEATOR - THE CITY OF LETHBRIDGE. 910 - 4TH AVE. SOUTH, LETHBRIDGE ALBERTA

TOTAL INSTRUMENTS: 005

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 7 DAY OF FEBRUARY, 2006 AT 11:17 A.M.

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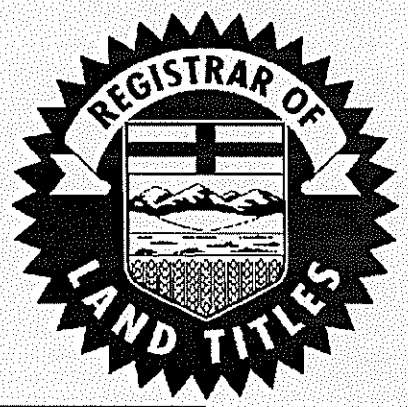
CUSTOMER FILE NUMBER: 05-8176



END OF CERTIFICATE

(CONTINUED)

SET OUT IN THE PARAGRAPH BELOW.

THE ABOVE PROVISIONS DO NOT PROHIBIT THE ORIGINAL PURCHASER FROM INCLUDING THIS UNMODIFIED PRODUCT IN ANY REPORT, OPINION, APPRAISAL OR OTHER ADVICE PREPARED BY THE ORIGINAL PURCHASER AS PART OF THE ORIGINAL PURCHASER APPLYING PROFESSIONAL, CONSULTING OR TECHNICAL EXPERTISE FOR THE BENEFIT OF CLIENT(S).

OS-8176

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0022 090 435	4;22;8;27;SW	841 077 241

LEGAL DESCRIPTION
MERIDIAN 4 RANGE 22 TOWNSHIP 8
SECTION 27
QUARTER SOUTH WEST
EXCEPTING THEREOUT ALL MINES AND MINERALS
AREA: 64.7 HECTARES (160 ACRES) MORE OR LESS

ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF LETHBRIDGE

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
841 077 241	04/05/1984			SEE INSTRUMENT

OWNERS

THE CITY OF LETHBRIDGE.
OF 910-4 AVE S
LETHBRIDGE
ALBERTA

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
741 091 031	27/09/1974	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT
751 006 968	27/01/1975	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED.

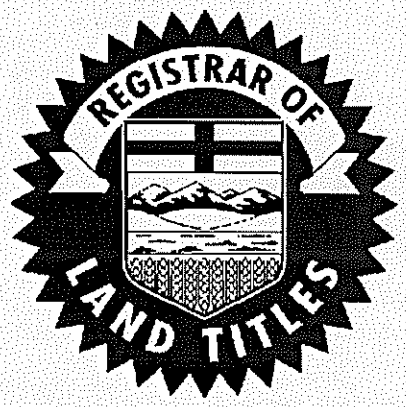
(CONTINUED)

TOTAL INSTRUMENTS: 002

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 7 DAY OF FEBRUARY, 2006 AT 11:21 A.M.

ORDER NUMBER:4551483

CUSTOMER FILE NUMBER: 05-8176



END OF CERTIFICATE

05-8176

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0029 977 014	4;22;8;27;SE	031 220 099 +55

LEGAL DESCRIPTION

THE SOUTH EAST QUARTER OF SECTION TWENTY SEVEN (27)
TOWNSHIP EIGHT (8)
RANGE TWENTY TWO (22)
WEST OF THE FOURTH MERIDIAN
CONTAINING 64.7 HECTARES (160 ACRES) MORE OR LESS
EXCEPTING:

PLAN	NUMBER	HECTARES	(ACRES)	MORE OR LESS
REPLOTTING SCHEME	7710705	21.36	52.89	
ROAD	0210492	2.931	7.24	
SUBDIVIISON	0211300	0.625	1.54	
SUBDIVISION	0212162	0.053	0.13	
SUBDIVISION	0310382	1.416	3.50	
SUBDIVISION	0311888	5.49	13.57	

EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF LETHBRIDGE

REFERENCE NUMBER: 031 216 679 +1

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
031 220 099	30/06/2003	SUBDIVISION PLAN		

OWNERS

WALTER J WILLMS

AND
CLARA B WILLMS
BOTH OF:
SITE 7,BOX 29,SS 1
CALGARY

(CONTINUED)

ALBERTA T2M 4N3
AS JOINT TENANTS

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
741 091 031	27/09/1974	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT
771 058 484	10/05/1977	CAVEAT RE : DEFERRED RESERVE CAVEATOR - THE OLDMAN RIVER REGIONAL PLANNING COMMISSION.
931 085 909	21/04/1993	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. 910 - 4TH AVE. SOUTH, LETHBRIDGE ALBERTA AS TO PORTION OR PLAN:9310837
041 145 785	26/04/2004	CAVEAT RE : AGREEMENT FOR SALE CAVEATOR - THE CITY OF LETHBRIDGE. DOUGLAS S. HUDSON 910-4 AVE SOUTH LETHBRIDGE ALBERTA T1J0P6 AGENT - DOUGLAS S HUDSON
041 360 476	22/09/2004	CAVEAT RE : ASSIGNMENT OF AGREEMENT FOR SALE CAVEATOR - CANADIAN WESTERN BANK. 6127 BARLOW TR SE CALGARY ALBERTA T2C4W8 AGENT - GARY J COCHRANE

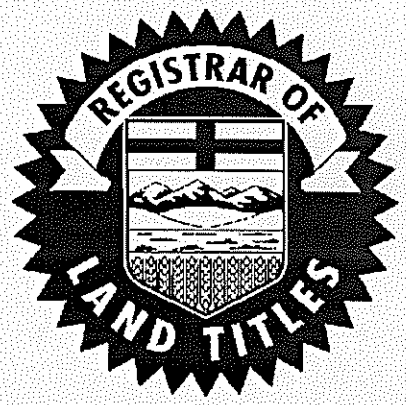
(CONTINUED)

TOTAL INSTRUMENTS: 005

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 7 DAY OF FEBRUARY, 2006 AT 11:21 A.M.

ORDER NUMBER:4551499

CUSTOMER FILE NUMBER: 05-8176



END OF CERTIFICATE

05-8176

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0031 114 648	4;22;8;22;NW	051 213 774 +1

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 22 TOWNSHIP 8
SECTION 22
QUARTER NORTH WEST
CONTAINING 64.7 HECTARES(160 ACRES) MORE OR LESS
EXCEPTING THEREOUT:

PLAN	NUMBER	HECTARES	(ACRES) MORE OR LESS
SUBDIVISION	0512143	32.393	80.04

EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF LETHBRIDGE

REFERENCE NUMBER: 871 100 487

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
051 213 774	16/06/2005	SUBDIVISION PLAN		

OWNERS

JENNY ANN SKINNER (FARMER)

AND
BEVERLY GAY SKINNER (LEDGER KEEPER)

AND
SHARON HUBBARD (HOUSEWIFE)
ALL OF:
P.O. BOX 576
LETHBRIDGE
ALBERTA
ALL AS JOINT TENANTS

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
741 091 031	27/09/1974	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT
751 006 968	27/01/1975	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED.
791 209 303	11/12/1979	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED.
981 102 147	09/04/1998	CAVEAT RE : SURFACE LEASE UNDER 20 ACRES CAVEATOR - BONAVISTA PETROLEUM LTD.. P.O. BOX 22192,BANKERS HALL POSTAL OUTLET CALGARY ALBERTA T2P4H5 (DATA UPDATED BY: TRANSFER OF CAVEAT 991026304) (DATA UPDATED BY: TRANSFER OF CAVEAT 011228042) (DATA UPDATED BY: TRANSFER OF CAVEAT 041186908)
981 102 148	09/04/1998	CAVEAT RE : RIGHT OF WAY AGREEMENT CAVEATOR - BONAVISTA PETROLEUM LTD.. P.O. BOX 22192,BANKERS HALL POSTAL OUTLET CALGARY ALBERTA T2P4H5 AGENT - DIANE VANDER VEEN (DATA UPDATED BY: TRANSFER OF CAVEAT 991026304) (DATA UPDATED BY: TRANSFER OF CAVEAT 011238126) (DATA UPDATED BY: TRANSFER OF CAVEAT 041187481)
981 356 450	16/11/1998	UTILITY RIGHT OF WAY GRANTEE - BONAVISTA PETROLEUM LTD.. P.O. BOX 22192,BANKERS HALL POSTAL OUTLET CALGARY ALBERTA T2P4H5 "RE-ENTERED 30/03/01 BY 011084942" (DATA UPDATED BY: TRANSFER OF UTILITY RIGHT

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
		OF WAY 011251218) (DATA UPDATED BY: TRANSFER OF UTILITY RIGHT OF WAY 041220522)
011 085 073	30/03/2001	DISCHARGE OF UTILITY RIGHT OF WAY 981356450 PARTIAL SEE INSTRUMENT
051 213 775	16/06/2005	CAVEAT RE : DEFERRED RESERVE CAVEATOR - THE CITY OF LETHBRIDGE. 910 4 TH AVENUE SOUTH LETHRIDGE ALBERTA

TOTAL INSTRUMENTS: 008

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 7 DAY OF FEBRUARY, 2006 AT 11:23 A.M.

ORDER NUMBER:4551540

CUSTOMER FILE NUMBER: 05-8176

END OF CERTIFICATE

05-8176

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0031 120 587	4;22;8;22;NE	051 220 164 +1

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 22 TOWNSHIP 8
SECTION 22
QUARTER NORTH EAST
CONTAINING 64.7 HECTARES(159.88 ACRES) MORE OR LESS
EXCEPTING THEREOUT:

PLAN	NUMBER	HECTARES	ACRES	MORE OR LESS
SUBDIVISION	0512218	32.374	80.00	

EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF LETHBRIDGE

REFERENCE NUMBER: 011 367 124

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
051 220 164	21/06/2005	SUBDIVISION PLAN		

OWNERS

SERDNA FARMS LTD..
OF 2213-24 AVENUE
COALDALE
ALBERTA T1M 1G8

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
741 091 031	27/09/1974	IRRIGATION ORDER/NOTICE

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
		THIS PROPERTY IS INCLUDED IN THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT
751 004 557	17/01/1975	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED.
041 479 994	20/12/2004	CAVEAT RE : PURCHASE AGREEMENT CAVEATOR - DAYTONA LAND CORP.. 404, 10216-124 ST EDMONTON ALBERTA T5N4A3 AGENT - WAYNE R LOVATT
051 030 315	24/01/2005	CAVEAT RE : RIGHT OF FIRST REFUSAL CAVEATOR - DAYTONA LAND CORP.. C/O LOVATT OLSEN 404, 10216-124 ST EDMONTON ALBERTA T5N4A3 AGENT - PETER R SEMONICK
051 220 165	21/06/2005	CAVEAT RE : DEFERRED RESERVE CAVEATOR - THE CITY OF LETHBRIDGE. 910 - 4TH AVE. SOUTH, LETHBRIDGE ALBERTA

TOTAL INSTRUMENTS: 005

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 7 DAY OF FEBRUARY, 2006 AT 11:25 A.M.

ORDER NUMBER:4551583

CUSTOMER FILE NUMBER: 05-8176

REGISTRAR OF LAND TITLES

END OF CERTIFICATE

(CONTINUED)

THIS ELECTRONICALLY TRANSMITTED LAND TITLES PRODUCT IS INTENDED FOR THE SOLE USE OF THE ORIGINAL PURCHASER, AND NONE OTHER, SUBJECT TO WHAT IS SET OUT IN THE PARAGRAPH BELOW.

THE ABOVE PROVISIONS DO NOT PROHIBIT THE ORIGINAL PURCHASER FROM INCLUDING THIS UNMODIFIED PRODUCT IN ANY REPORT, OPINION, APPRAISAL OR OTHER ADVICE PREPARED BY THE ORIGINAL PURCHASER AS PART OF THE ORIGINAL PURCHASER APPLYING PROFESSIONAL, CONSULTING OR TECHNICAL EXPERTISE FOR THE BENEFIT OF CLIENT(S).

05-8176

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0022 102 685	4;22;8;23;NW	751 130 428

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 22 TOWNSHIP 8
SECTION 23
QUARTER NORTH WEST
CONTAINING 64.7 HECTARES (160 ACRES) MORE OR LESS
EXCEPTING

PLAN	NUMBER	ACRES MORE OR LESS
SUBDIVISION	7710684	52.32
REPLOTTING SCHEME	7710705	0.06
REPLOTTING SCHEME	7710882	71.57
REPLOTTTNG SCHEME	7810431	9.01

EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF LETHBRIDGE

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
751 130 428	19/11/1975		$36,050	

OWNERS

THE CITY OF LETHBRIDGE.
OF 910 - 4TH AVENUE S., LETHBRIDGE
ALBERTA T1J 0P6

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
741 003 252	10/01/1974	CAVEAT

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
		RE : DEFERRED RESERVE CAVEATOR - THE OLDMAN RIVER REGIONAL PLANNING COMMISSION.
771 055 709	04/05/1977	CAVEAT RE : DEFERRED RESERVE CAVEATOR - THE OLDMAN RIVER REGIONAL PLANNING COMMISSION.

TOTAL INSTRUMENTS: 002

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 7 DAY OF FEBRUARY, 2006 AT 11:25 A.M.

ORDER NUMBER:4551606

CUSTOMER FILE NUMBER: 05-8176

END OF CERTIFICATE

Appendix B
Land Use Statistics

Table 1 –Land Use Statistics

Use	Hectares	%	Units	%	Population	%
Gross Area	**94.71**					
Whoop-Up Drive	0.74					
Benton Drive	1.26					
Sub-total	2.00					
Gross Developable Area	**92.71**					
Parks/Municipal Reserve	6.68	7.2%				
Stormwater Facility	4.37	4.7%				
Circulation	22.47	24.2%				
Institutional	1.73	1.9%				
Subtotal- Other Uses	**35.25**	**38.0%**				
Residential						
Low Density – 21 upha	43.98	47.4%	924	53.1%	2586	62.5%
Medium Density - 37 upha	5.16	5.6%	191	11.0%	363	8.8%
Medium Density – 75 upha	8.32	9.0%	624	35.9%	1186	28.7%
Subtotal - Residential	**57.46**	**62.0%**	**1739**	**100.0%**	**4134**	**100.0%**

Appendix C

Historical Resource Letter

Alberta
COMMUNITY DEVELOPMENT

Cultural Facilities and
Historical Resources
Heritage Resource Management

Old St. Stephen's College
8820 - 112 Street
Edmonton, Alberta
Canada T6G 2P8
www.cd.gov.ab.ca/hrm

Telephone 780/431-2300
Fax 780/427-5598

August 3, 2004

Project File: 4835-04-134

Mr. Armin Preiksaitis
Armin A. Preiksaitis & Associates Ltd.
#408 The Boardwalk
10310 – 102 Avenue
Edmonton, AB T5J 2X6

Dear Mr. Preiksaitis:

SUBJECT: ARMIN A. PREIKSAITIS & ASSOCIATES LTD.
WEST LETHBRIDGE AREA STRUCTURE PLAN
SECTIONS 21, 22, 23, 27, 28, 33, & 34, TOWNSHIP 8, RANGE 22, W4M
***HISTORICAL RESOURCES ACT* REQUIREMENTS**

The Cultural Facilities and Historical Resources Division ("CFHRD") of Alberta Community Development has completed the review of the WEST LETHBRIDGE AREA STRUCTURE PLAN. **A Historical Resources Impact Assessment is not required.** Therefore, Armin A. Preiksaitis & Associates Ltd. has *Historical Resources Act* clearance for the WEST LETHBRIDGE AREA STRUCTURE PLAN.

HISTORICAL RESOURCES ACT REQUIREMENTS

Pursuant to Section 31 of the *Historical Resources Act*, should any historic resources be encountered during construction activities, please contact George Chalut, Resource Management Planner, Cultural Facilities and Historical Resources Division, Alberta Community Development, 8820 – 112 Street, Edmonton, Alberta, T6G 2P8; telephone at (780) 431-2329 or fax (780) 427-3956. It will then be necessary for the CFHRD to issue further instructions regarding the documentation of these resources. On behalf of the Cultural Facilities and Historical Resources Division, I would like to thank you and officials of the Armin A. Preiksaitis & Associates Ltd. for your continued cooperation in our endeavour to conserve Alberta's past.

Sincerely,

George Chalut
Resource Management Planner
Protection & Stewardship Section

Appendix D
Water Modelling Results

Scenario: ADD

NETWORK SUMMARY - COPPERWOOD

Outline Plan Population: 5275

Design ADD: 415 Lpcd

Outline Plan Average Day Demand: 25.34 L/s

Color Coding Legend
Link: Diameter (mm)

	<= 100
	<= 150
	<= 200
	<= 250
	<= 300
	<= 400
	<= 500
	<= 600
	<= 750

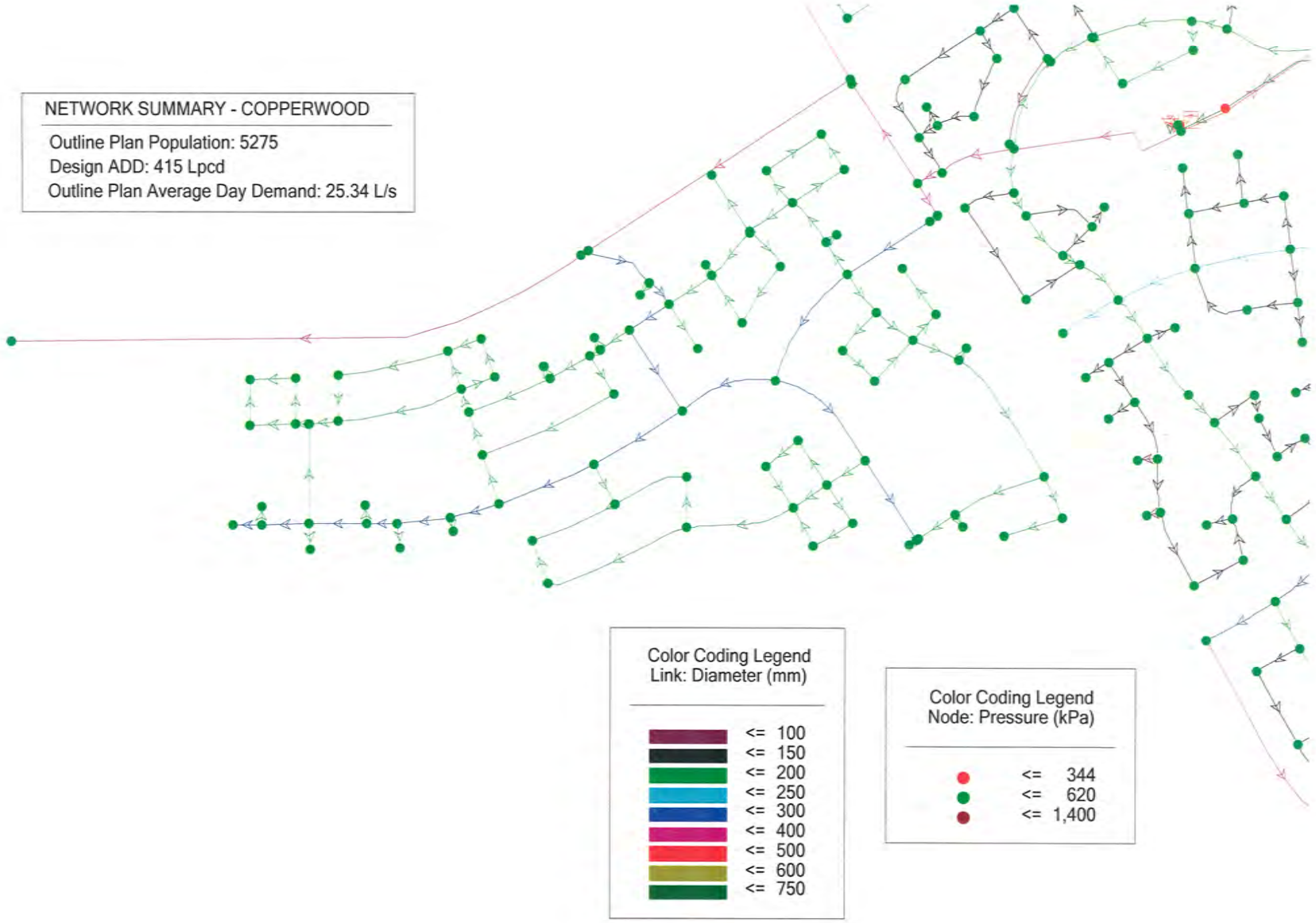
Color Coding Legend
Node: Pressure (kPa)

	<= 344
	<= 620
	<= 1,400

Title: Copperwood Water Distribution Network: Average Day Demand - Regional
p:\...\2004 west skeleton_copperwood_add_op.wcd
12/07/05 02:27:38 PM

Project Engineer: C. Gallagher
WaterCAD v7.0 [07.00.049.00]

Scenario: ADD



Scenario: MDD

NETWORK SUMMARY - COPPERWOOD

Outline Plan Population: 5275
Design MDD: 922 Lpcd
Outline Plan Maximum Day Demand: 56.29 L/s

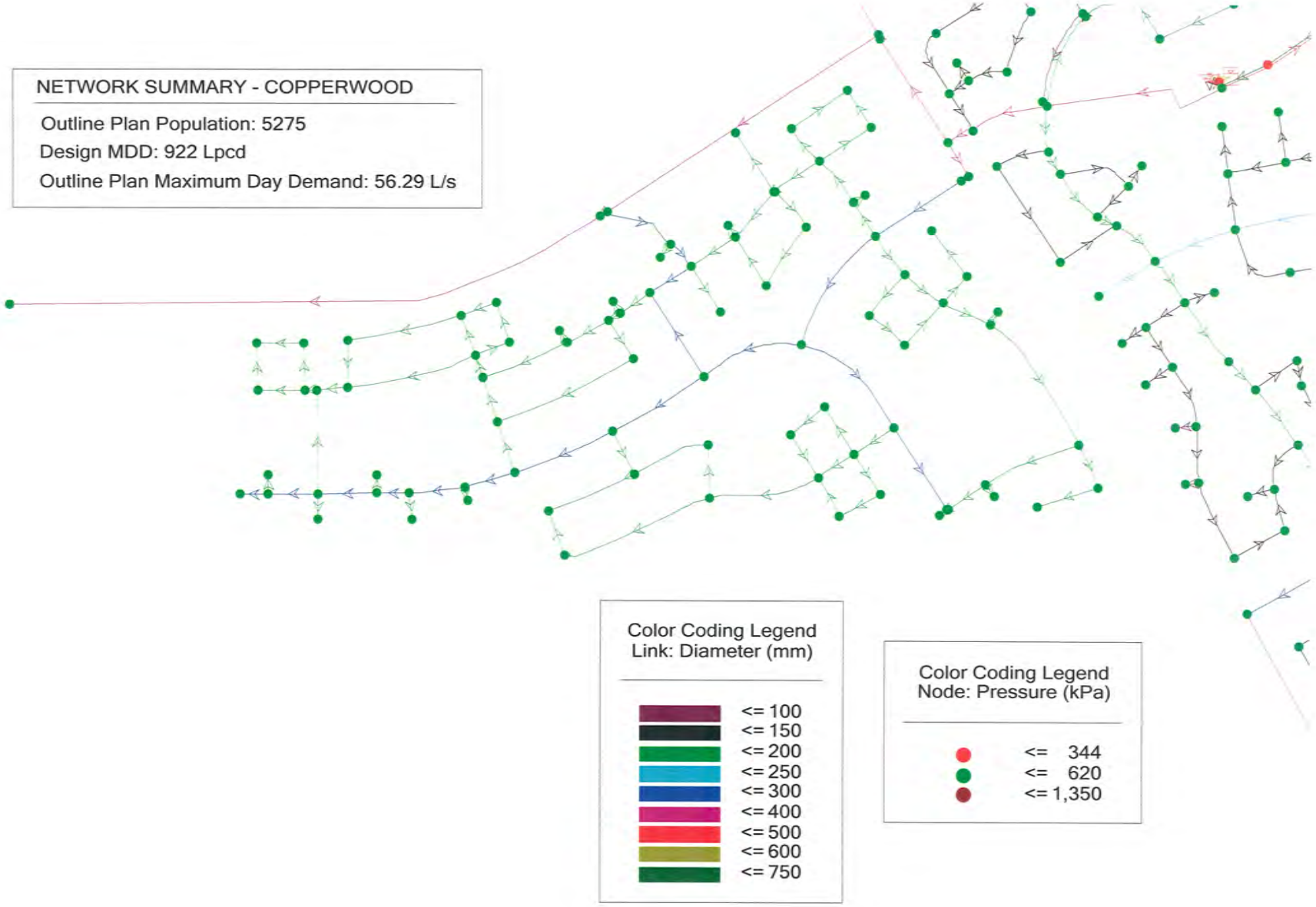
Color Coding Legend
Link: Diameter (mm)

	<= 100
	<= 150
	<= 200
	<= 250
	<= 300
	<= 400
	<= 500
	<= 600
	<= 750

Color Coding Legend
Node: Pressure (kPa)

	<= 344
	<= 620
	<= 1,350

Scenario: MDD



Scenario: PHD

NETWORK SUMMARY - COPPERWOOD

Outline Plan Population: 5275

Design PHD: 1460 Lpcd

Outline Plan Peak Hour Demand: 89.14 L/s

Color Coding Legend
Link: Diameter (mm)

	<= 100
	<= 150
	<= 200
	<= 250
	<= 300
	<= 400
	<= 500
	<= 600
	<= 750

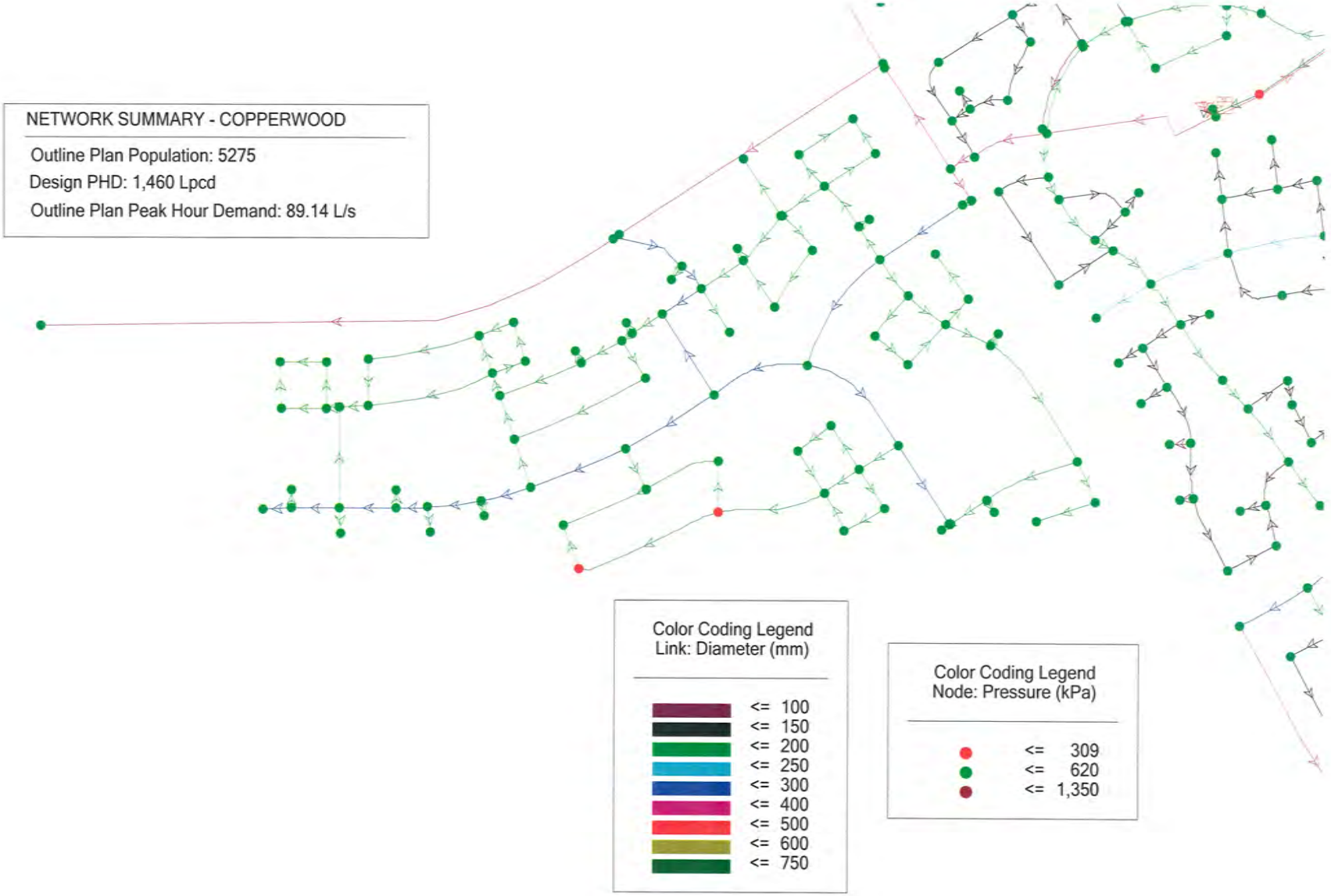
Color Coding Legend
Node: Pressure (kPa)

	<= 309
	<= 620
	<= 1,350

Title: Copperwood Water Distribution Network: Peak Hour Demand - Regional
p:\...\2004 west skeleton_copperwood_phd_op.wcd
12/07/05 02:52:45 PM

Project Engineer: C. Gallagher
WaterCAD v7.0 [07.00.049.00]

Scenario: PHD



Scenario: MDD - Fire Flow

NETWORK SUMMARY - COPPERWOOD

Outline Plan Population: 5275
Design MDD: 922 Lpcd
Outline Plan Maximum Day Demand: 56.29 L/s
Fire Flow: 75 L/s
Minimum Residual Pressure: 150 kPa

Color Coding Legend
Link: Diameter (mm)

- <= 100
- <= 150
- <= 200
- <= 250
- <= 300
- <= 400
- <= 500
- <= 600
- <= 750

Color Coding Legend
Node: Satisfies Fire Flow Constraints?

- true

Title: Copperwood Water Distribution Network: Maximum Day Demand with Fire Flow - Regional
2004 west skeleton_copperwood_mdd-fire flow_op.wcd
12/07/05 04:26:17 PM

Project Engineer: C. Gallagher
WaterCAD v7.0 [07.00.049.00]

Appendix E

Confirmation from LNID

Geremia, Nick

From: Pat Spanos [ps_lnid@telus.net]
Sent: Thursday, August 18, 2005 3:13 PM
To: Geremia, Nick
Cc: alan_h@telusplanet.net
Subject: Re: Irrigation water for Copperwood

Nick:

The City needs to enter into a Water Conveyance Agreement Type 2 with a maximum of 20 acre feet with the LNID. What are their maximum water requirements at this location.

The connection and all works will be the City's cost, capital and maintenance, and save the LNID harmless from all claims if something happens to the pipeline.

Regards,

Patrick G. Spanos

----- Original Message -----
From: Geremia, Nick
To: ps_lnid@telus.net
Sent: Wednesday, August 17, 2005 3:56 PM
Subject: Irrigation water for Copperwood

Hi Pat

We are currently preparing an outline plan for the Copperwood Development located west of Benton and south of Whoop-up Drive West. We would like to use the LNID pipeline crossing Whoop-up Drive, east of Benton Drive to provide supplementary water to the wet pond proposed for this development; similar to RiverBend subdivision.

Would this be possible and if so can you provide me with steps required for this.

Thank you for your co operation.

Regards

Nick Geremia, R.E.T.
Email nick.geremia@uma.aecom.com
Direct Line: 403.329.7130
Cell: 403.634.5026

UMA Engineering Ltd.
514 Stafford Drive North, Lethbridge AB T1H 2B2
T 403 329.4822 F 403.329.1678

Appendix F
Master Servicing Plan

Figure 11 – Water Distribution System – Site Plan

Figure 12 – Sanitary Sewer System – Site Plan

Figure 13 – Sanitary Sewer System – Analysis

Figure 14 – Minor Storm Sewer System – Site Plan

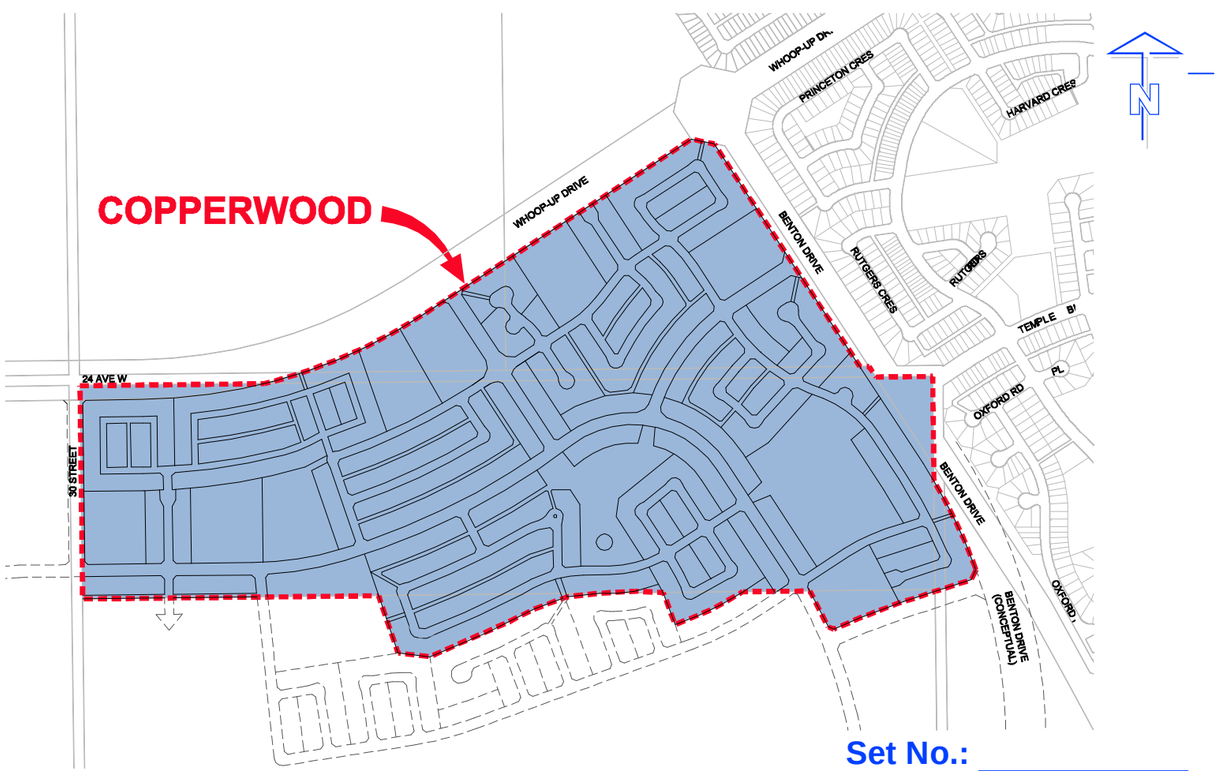
Figure 15 – Minor Storm Sewer System – Zones 1 thru 5 & 7 Analysis

Figure 16 – Minor Storm Sewer System – Zones 6 & 8 Analysis

Daytona Urban Development Corp
Copperwood, West Lethbridge

Outline Plan - Master Servicing Plan

LIST OF PROJECT DRAWINGS



Issue Date:

AECOM

Set No.:

PROJECT NUMBER	DRAWING NUMBER	ISSUE/REVISION
G732-003-00	03-CP0001	A

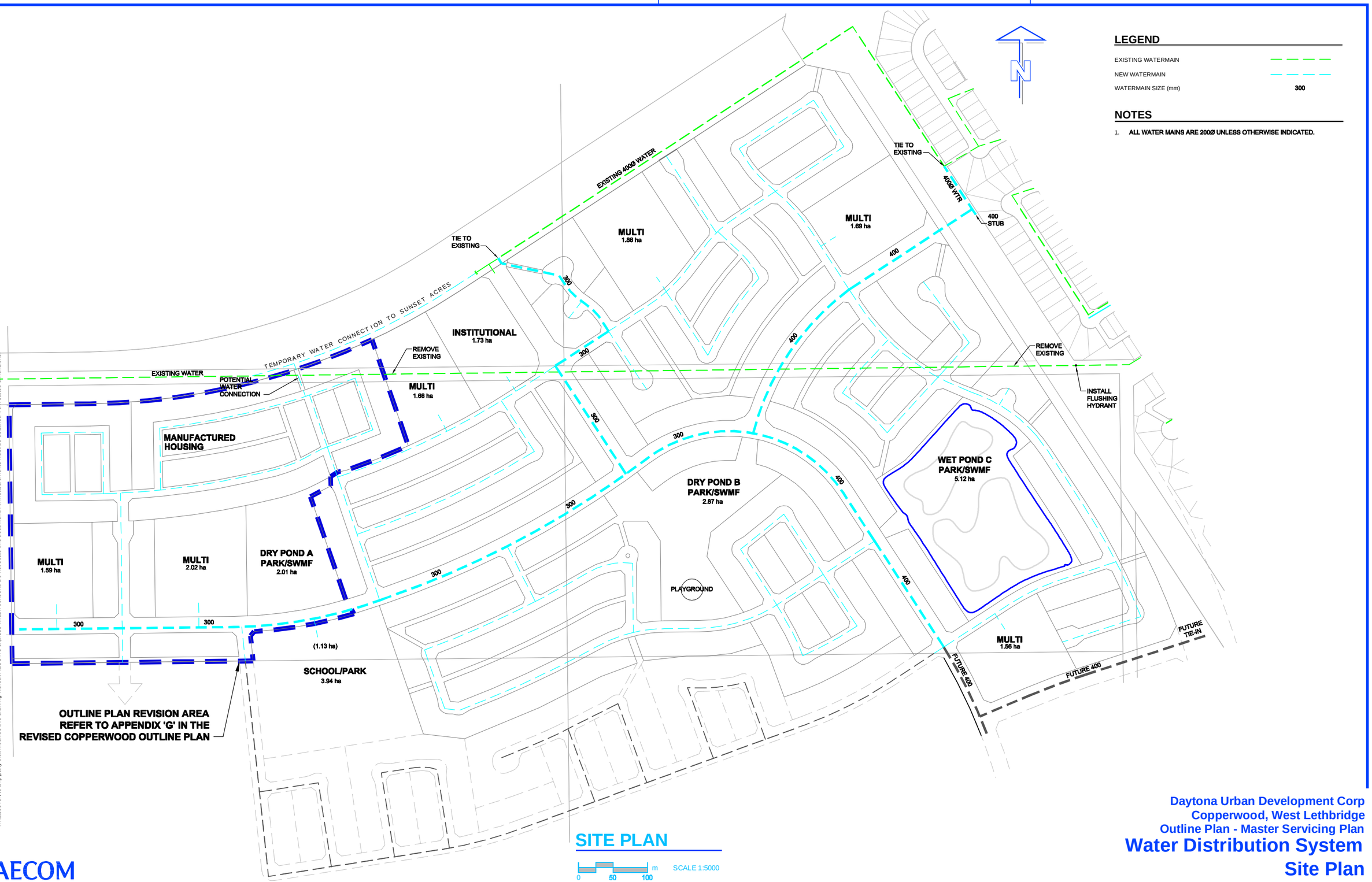
B SIZE 11" x 17" (279.4mm x 431.8mm)

PLOT: 10/01/05 11:33:34 AM

Saved By: armstrongt

ISS/REV: A

AECOM FILE NAME: G732-003-00_03-CPF001_RX.dwg



LEGEND

EXISTING WATERMAIN	
NEW WATERMAIN	
WATERMAIN SIZE (mm)	300

NOTES

1. ALL WATER MAINS ARE 200Ø UNLESS OTHERWISE INDICATED.

SITE PLAN

0 50 100 m SCALE 1:5000

AECOM

Daytona Urban Development Corp
Copperwood, West Lethbridge
Outline Plan - Master Servicing Plan

Water Distribution System

Site Plan

Figure - 11

B SIZE 11" x 17" (279.4mm x 431.8mm)

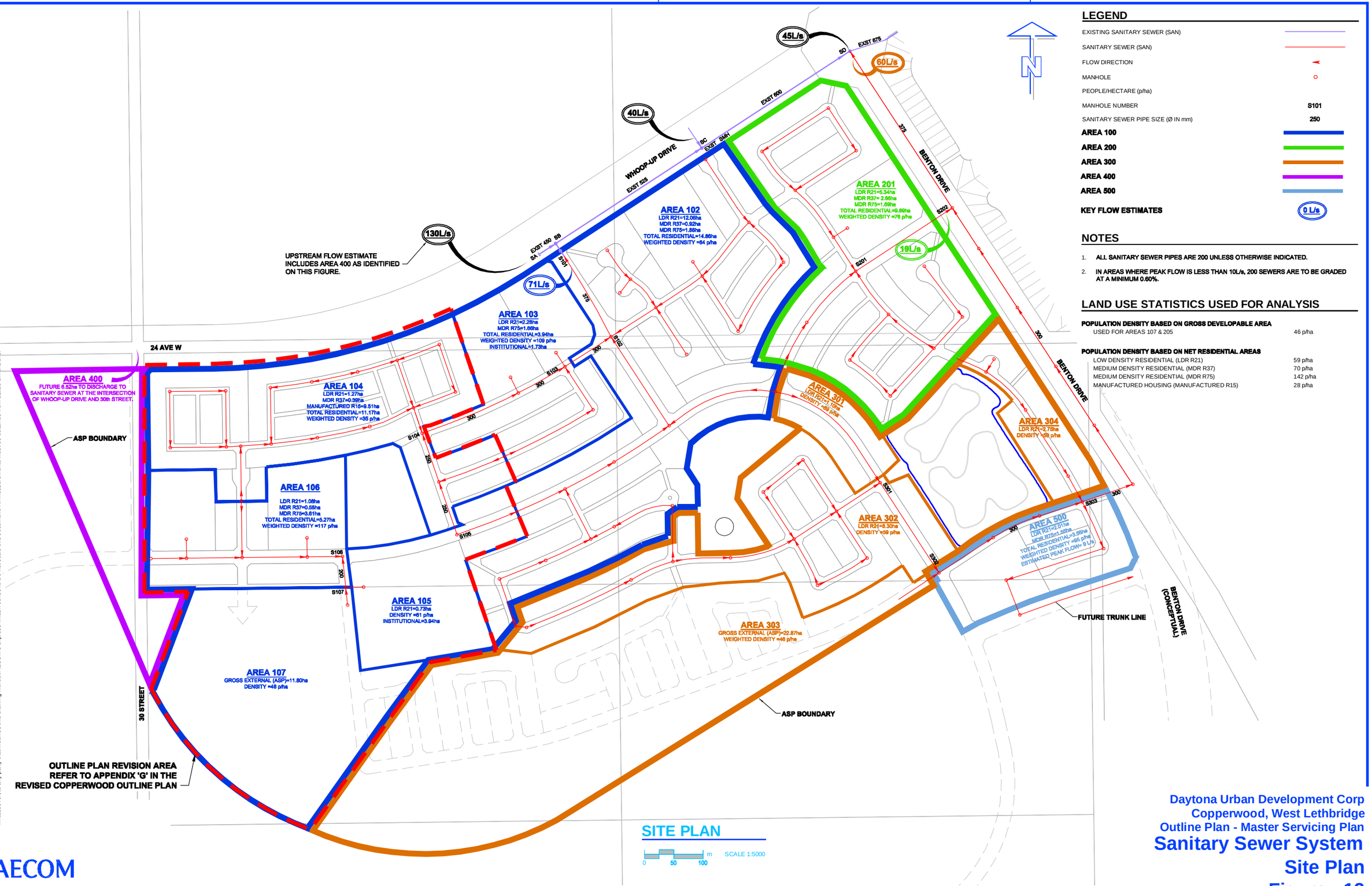
PLOT: 10/01/05 11:35:06 AM

Saved By: wallacee

G732-003-00_03-CPF002_RX.dwg

ISS/REV: A

AECOM FILE NAME:



LEGEND

- EXISTING SANITARY SEWER (SAN)
- SANITARY SEWER (SAN)
- FLOW DIRECTION
- MANHOLE
- PEOPLE/HECTARE (p/ha)
- MANHOLE NUMBER — S101
- SANITARY SEWER PIPE SIZE (Ø IN mm) — 250
- **AREA 100**
- **AREA 200**
- **AREA 300**
- **AREA 400**
- **AREA 500**
- **KEY FLOW ESTIMATES** — 0 L/s

NOTES

1. **ALL SANITARY SEWER PIPES ARE 200 UNLESS OTHERWISE INDICATED.**
2. **IN AREAS WHERE PEAK FLOW IS LESS THAN 10L/s, 200 SEWERS ARE TO BE GRADED AT A MINIMUM 0.60%.**

LAND USE STATISTICS USED FOR ANALYSIS

POPULATION DENSITY BASED ON GROSS DEVELOPABLE AREA

USED FOR AREAS 107 & 205	46 p/ha

POPULATION DENSITY BASED ON NET RESIDENTIAL AREAS

LOW DENSITY RESIDENTIAL (LDR R21)	59 p/ha
MEDIUM DENSITY RESIDENTIAL (MDR R37)	70 p/ha
MEDIUM DENSITY RESIDENTIAL (MDR R75)	142 p/ha
MANUFACTURED HOUSING (MANUFACTURED R15)	28 p/ha

SITE PLAN

0 50 100 m SCALE 1:5000

AECOM

Daytona Urban Development Corp
Copperwood, West Lethbridge
Outline Plan - Master Servicing Plan

Sanitary Sewer System
Site Plan
Figure - 12

AREA 100

RESIDENTIAL — Infiltration 0.15 m³/ha/day — Per Capita Dry Flow 0.400 m³/cap/day — Per Capita Wet 0.500 m³/cap/day

Area ID	From MH	To MH	Area ha	Pop Density pers/ha	Pop Increment	Cumulative Population	Dry Weather Flows: Flow Increment m³/day	Dry Weather Flows: Cumulative Avg. Flow m³/day	Dry Weather Flows: Peaking Factor	Dry Weather Flows: Cumulative Peak Flow m³/day	Wet: Cumulative Flow m³/day	Wet: Cumulative Infiltration m³/day	Cumulative Flow m³/day
107	107	106	11.80	46	543	543	217.12	217.12	3.96	858.84	271.400	81.420	**1211.66**
106	106	105	5.27	117	617	1159	246.64	463.76	3.76	1742.64	579.695	173.909	**2496.25**
105	105	104	0.73	61	45	1204	17.81	481.57	3.75	1804.24	601.960	180.588	**2586.79**
104	104	103	11.17	35	391	1595	156.38	637.95	3.66	2334.98	797.435	239.231	**3371.64**
103	103	102	3.94	109	429	2024	171.78	809.73	3.58	2900.21	1012.165	303.650	**4216.03**
102	102	101	12.06	64	772	2796	308.74	1118.47	3.47	3879.06	1398.085	419.426	**5696.57**

INSTITUTIONAL — WWF & Infiltration 9.75 m³/ha/day

Area ID	From MH	To MH	Area ha	Cumulative Area ha	Avg Unit Flow m³/day/ha	Flow Increment m³/day	Cumulative Avg. Flow m³/day	Peaking Factor AE 7.1.1.2.(3)	Cumulative Peak Flow m³/day	Infiltration m³/day	Cumulative Flow m³/day
107	107	106	0.00	0.00	0.00	0.00	0.00	1.0	**0.00**	0.000	**0.00**
106	106	105	0.00	0.00	0.00	0.00	0.00	1.0	**0.00**	0.000	**0.00**
105	105	104	3.94	3.94	20.00	78.80	78.80	3.2	**252.16**	38.415	**290.58**
104	104	103	0.00	3.94	0.00	0.00	78.80	3.2	**252.16**	38.415	**290.58**
103	103	102	1.73	5.67	20.00	34.60	113.40	3.0	**340.20**	55.283	**395.48**
102	102	101	0.00	5.67	0.00	0.00	113.40	3.0	**340.20**	55.283	**395.48**

SEWER DESIGN

ZONES: Area ID	From MH	To MH	PIPE SIZING: Sewer Length m	Cumulative Peak m³/d	Cumulative Peak L/s	Sewer Diameter m	Slope m/m	Mannings n	Full Pipe Capacity L/s	A.E. 7.2.1.2. Capacity Req=Peak/.86 Q=L/s
107	107	106	50.000	1211.663	**14**	0.200	0.0040	0.013	21	16.3
106	106	105	200.000	2496.245	**29**	0.250	0.0035	0.013	35	33.6
105	105	104	180.000	2877.360	**33**	0.250	0.0045	0.013	40	38.7
104	104	103	270.000	3662.219	**42**	0.300	0.0025	0.013	48	49.3
103	103	102	90.000	4611.512	**53**	0.300	0.0040	0.013	61	62.1
102	102	101	150.000	6092.051	**71**	0.300	0.0091	0.013	92	82.0

AREA 200

RESIDENTIAL — Infiltration 0.15 m³/ha/day — Per Capita Dry Flow 0.400 m³/cap/day — Per Capita Wet 0.500 m³/cap/day

Area ID	From MH	To MH	Area ha	Pop Density pers/ha	Pop Increment	Cumulative Population	Dry Weather Flows: Flow Increment m³/day	Dry Weather Flows: Cumulative Avg. Flow m³/day	Dry Weather Flows: Peaking Factor	Dry Weather Flows: Cumulative Peak Flow m³/day	Wet: Cumulative Flow m³/day	Wet: Cumulative Infiltration m³/day	Cumulative Flow m³/day
201	201	202	9.89	76	752	752	300.66	300.66	3.88	1165.50	375.820	112.746	**1654.07**
NA	201	EXST											

SEWER DESIGN

ZONES: Area ID	From MH	To MH	PIPE SIZING: Sewer Length m	Cumulative Peak m³/d	Cumulative Peak L/s	Sewer Diameter m	Slope m/m	Mannings n	Full Pipe Capacity L/s	A.E. 7.2.1.2. Capacity Req=Peak/.86 Q=L/s
201	201	202	200.000	1654.069	**19**	0.200	0.0040	0.013	21	22.3

AREA 300

RESIDENTIAL — Infiltration 0.15 m³/ha/day — Per Capita Dry Flow 0.400 m³/cap/day — Per Capita Wet 0.500 m³/cap/day

Area ID	From MH	To MH	Area ha	Pop Density pers/ha	Pop Increment	Cumulative Population	Dry Weather Flows: Flow Increment m³/day	Dry Weather Flows: Cumulative Avg. Flow m³/day	Dry Weather Flows: Peaking Factor	Dry Weather Flows: Cumulative Peak Flow m³/day	Wet: Cumulative Flow m³/day	Wet: Cumulative Infiltration m³/day	Cumulative Flow m³/day
301&302	301	302	9.40	59	555	555	221.84	221.84	3.95	876.41	277.300	83.190	**1236.90**
303	302	303	22.87	46	1052	1607	420.81	642.65	3.66	2350.67	803.310	240.993	**3394.98**
304	303	202	2.75	59	162	1769	64.90	707.55	3.63	2566.03	884.435	265.331	**3715.79**
200	202	EXST	9.89	76	752	2521	300.66	1008.20	3.51	3534.30	1260.255	378.077	**5172.63**

SEWER DESIGN

ZONES: Area ID	From MH	To MH	PIPE SIZING: Sewer Length m	Cumulative Peak m³/d	Cumulative Peak L/s	Sewer Diameter m	Slope m/m	Mannings n	Full Pipe Capacity L/s	A.E. 7.2.1.2. Capacity Req=Peak/.86 Q=L/s
301&302	301	302	190.000	1236.903	**14**	0.200	0.0040	0.013	21	16.6
303	302	303	280.000	3394.977	**39**	0.300	0.0023	0.013	46	45.7
304	303	202	660.000	3715.792	**43**	0.300	0.0027	0.013	50	50.0
200	202	EXST	320.000	5172.634	**60**	0.375	0.0020	0.013	78	69.6

LAND USE STATISTICS USED FOR ANALYSIS

POPULATION DENSITY BASED ON GROSS DEVELOPABLE AREA
USED FOR AREAS 107 & 205 — 46 p/ha

POPULATION DENSITY BASED ON NET RESIDENTIAL AREAS
LOW DENSITY RESIDENTIAL (LDR R21) — 59 p/ha
MEDIUM DENSITY RESIDENTIAL (MDR R37) — 70 p/ha
MEDIUM DENSITY RESIDENTIAL (MDR R75) — 142 p/ha
MANUFACTURED HOUSING (MANUFACTURED R15) — 28 p/ha

FOR AREA 100 REVISIONS
REFER TO APPENDIX 'G' IN THE
REVISED COPPERWOOD OUTLINE PLAN

WHOOP UP DRIVE ANALYSIS

FROM MH	TO MH	ESTIMATED DESIGN FLOW L/s	PIPE DIAMETER mm	PIPE GRADE %	PIPE CAPACITY L/s	PIPE CAPACITY*.86 A.E.7.2.1.2 (L/s)
SA	**SB**	**130**	450	0.30	156	**134**
SB	**SC**	**203**	525	0.30	236	**203**
SC	**SD**	**243**	600	0.30	336	**289**
SD	**TRUNK**	**348**	675	0.25	420	**361**

WHOOP-UP DRIVE ANALYSIS

ANALYSIS OF WHOOP-UP DRIVE SANITARY SEWER TRUNK AS OUTLINED IN THIS TABLE IS A COMBINATION OF COPPERWOOD OUTLINE PLAN DESIGN DATA, AND EXTERNAL DATA PROVIDED TO UMA ENGINEERING BY THE CITY OF LETHBRIDGE INFRASTRUCTURE SERVICE THIS DATA REPRESENTS THE BEST DESIGN INFORMATION AVAILABLE AT TIME OF OUTLINE PLAN PREPARATION.

AECOM

Daytona Urban Development Corp
Copperwood, West Lethbridge
Outline Plan - Master Servicing Plan

Sanitary Sewer System Analysis
Figure - 13

LEGEND

	NEW	EXISTING
STORM SEWER (STW)		
OPTIONAL STORM SEWER		
MANHOLE		
FLOW DIRECTION		
ZONE A - 26.65 ha		
ZONE B - 30.74 ha		
ZONE C - 46.27 ha		
WET POND - HIGH WATER LEVEL (EL-934.00)		
IRRIGATION WATER SUPPLY PIPE		
CATCHMENT AREA IDENTIFICATION	AREA A5	
MANHOLE NUMBER	M101	
STORM SEWER PIPE SIZE (Ø IN mm)	1050	

NOTES

1. **ALL STORM SEWER PIPES ARE 300Ø OR 375Ø UNLESS OTHERWISE INDICATED.**

OUTLINE PLAN REVISION AREA
REFER TO APPENDIX 'G' IN THE REVISED COPPERWOOD OUTLINE PLAN

SUPPLEMENTARY WATER FOR WET POND FROM LNID

OVERLAND DRAINAGE TO NORTH

OVERLAND DRAINAGE TO ASP SWMF #8

TIE-IN AT SIMON FRASER BLVD WEST

SITE PLAN

0 50 100 m SCALE 1:5000

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Daytona Urban Development Corp
Copperwood, West Lethbridge
Outline Plan - Master Servicing Plan

Minor Storm Sewer System
Site Plan
Figure - 14

ZONE 1	UPSTREAM CONTRIBUTIONS (ZONES): NONE					TOTAL A*C UPSTREAM		0									
ACCUMULATED CATCHMENTS									PIPE SIZING							TIME (TC)	
AREAS COMB.	FROM MH	TO MH	AREA (ha)	C	A*C	TOTAL A*C	I mm/hr	Q.req (m^3/s)	LENGTH (m)	SIZE (m)	SLOPE m/m	MANN n	VEL.des (m/s)	Q.des (m^3/s)	Q.req (m^3/s)	SECT min.	ACC min.
A11,A12,A13	101	102	4.32	0.51	2.20	2.20	60.1	**0.368**	127.530	0.675	0.00200	0.013	1.05	**0.376**	**0.368**	2.02	20.00
A14,A15	102	103	3.16	0.59	1.86	4.07	56.6	**0.640**	122.740	1.200	0.00100	0.013	1.09	**1.233**	**0.640**	1.88	22.02
A16,A17	103	104	6.98	0.00	0.00	4.07	53.7	**1.030**	114.630	1.200	0.00100	0.013	1.09	**1.233**	**1.030**	1.75	23.90
	104																
Totals			**14.46**			**4.07**			**364.900**								**23.90**

ZONE 2	UPSTREAM CONTRIBUTIONS (ZONES): NONE					TOTAL A*C UPSTREAM		0									
ACCUMULATED CATCHMENTS									PIPE SIZING							TIME (TC)	
AREAS COMB.	FROM MH	TO MH	AREA (ha)	C	A*C	TOTAL A*C	I mm/hr	Q.req (m^3/s)	LENGTH (m)	SIZE (m)	SLOPE m/m	MANN n	VEL.des (m/s)	Q.des (m^3/s)	Q.req (m^3/s)	SECT min.	ACC min.
A1	201	202	2.63	0.50	1.32	1.32	60.1	**0.220**	74.110	0.600	0.00180	0.013	0.92	**0.261**	**0.220**	1.34	20.00
A2,3	202	203	2.43	0.50	1.22	2.53	57.7	**0.406**	122.690	0.750	0.00140	0.013	0.94	**0.417**	**0.406**	2.17	21.34
A4	203	204	0.64	0.50	0.32	2.85	54.2	**0.430**	130.420	0.900	0.00100	0.013	0.90	**0.572**	**0.430**	2.41	23.51
A5,6,7	204	205	3.22	0.50	1.61	4.46	50.9	**0.631**	46.100	1.050	0.00080	0.013	0.89	**0.772**	**0.631**	0.86	25.92
A8	205	104	1.38	0.40	0.55	5.01	49.8	**0.694**	177.700	1.050	0.00080	0.013	0.89	**0.772**	**0.694**	3.32	26.78
	104																
Totals			**10.30**			**5.01**			**551.020**								**26.78**

ZONE 3	UPSTREAM CONTRIBUTIONS (ZONES): ZONES 1 & 2					TOTAL A*C UPSTREAM		9.08									
ACCUMULATED CATCHMENTS									PIPE SIZING							TIME (TC)	
AREAS COMB.	FROM MH	TO MH	AREA (ha)	C	A*C	TOTAL A*C	I mm/hr	Q.req (m^3/s)	LENGTH (m)	SIZE (m)	SLOPE m/m	MANN n	VEL.des (m/s)	Q.des (m^3/s)	Q.req (m^3/s)	SECT min.	ACC min.
A10	104	301	1.26	0.40	0.50	9.58	49.8	**1.327**	200.100	1.200	0.00200	0.013	1.54	**1.744**	**1.327**	2.16	26.78
B1,2,3	301	302	5.19	0.40	2.08	11.66	47.3	**1.533**	212.590	1.200	0.00200	0.013	1.54	**1.744**	**1.533**	2.30	28.94
	302																
Totals			**6.45**			**11.66**			**412.690**								**28.94**

FOR ZONE 1 AND 2 REVISIONS
REFER TO APPENDIX 'G' IN THE
REVISED COPPERWOOD OUTLINE PLAN

ZONE 4A	UPSTREAM CONTRIBUTIONS (ZONES): NONE					TOTAL A*C UPSTREAM		0									
ACCUMULATED CATCHMENTS									PIPE SIZING							TIME (TC)	
AREAS COMB.	FROM MH	TO MH	AREA (ha)	C	A*C	TOTAL A*C	I mm/hr	Q.req (m^3/s)	LENGTH (m)	SIZE (m)	SLOPE m/m	MANN n	VEL.des (m/s)	Q.des (m^3/s)	Q.req (m^3/s)	SECT min.	ACC min.
C13,14	401a	402a	1.61	0.40	0.64	0.64	60.1	**0.108**	123.480	0.600	0.00180	0.013	0.92	**0.261**	**0.108**	2.23	20.00
C11,12	402a	403a	4.08	0.54	2.20	2.85	56.2	**0.445**	90.300	0.750	0.00150	0.013	0.98	**0.431**	**0.445**	1.54	22.23
B13,14	403a	401c	2.40	0.40	0.96	3.81	53.8	**0.570**	91.460	0.900	0.00110	0.013	0.94	**0.600**	**0.570**	1.61	23.77
	401c																
Totals			**8.09**			**3.81**			**305.240**								**23.77**

ZONE 4B	UPSTREAM CONTRIBUTIONS (ZONES): NONE					TOTAL A*C UPSTREAM		0									
ACCUMULATED CATCHMENTS									PIPE SIZING							TIME (TC)	
AREAS COMB.	FROM MH	TO MH	AREA (ha)	C	A*C	TOTAL A*C	I mm/hr	Q.req (m^3/s)	LENGTH (m)	SIZE (m)	SLOPE m/m	MANN n	VEL.des (m/s)	Q.des (m^3/s)	Q.req (m^3/s)	SECT min.	ACC min.
B7	401b	402b	1.66	0.70	1.16	1.16	60.1	**0.194**	94.260	0.525	0.00600	0.013	1.54	**0.333**	**0.194**	1.02	20.00
B8,9,10	402b	401c	3.99	0.53	2.11	3.28	58.3	**0.531**	93.800	0.900	0.01200	0.013	3.12	**1.983**	**0.531**	0.50	21.02
	401c																
Totals			**5.65**			**3.28**			**188.060**								**21.02**

ZONE 4C	UPSTREAM CONTRIBUTIONS (ZONES): ZONES 4A & 4B					TOTAL A*C UPSTREAM		7.09									
ACCUMULATED CATCHMENTS									PIPE SIZING							TIME (TC)	
AREAS COMB.	FROM MH	TO MH	AREA (ha)	C	A*C	TOTAL A*C	I mm/hr	Q.req (m^3/s)	LENGTH (m)	SIZE (m)	SLOPE m/m	MANN n	VEL.des (m/s)	Q.des (m^3/s)	Q.req (m^3/s)	SECT min.	ACC min.
B11,12,15	401c	302	2.76	0.40	1.10	8.19	52.8	**1.203**	175.980	1.050	0.00200	0.013	1.41	**1.221**	**1.203**	2.08	24.50
	302																
Totals			**2.76**			**8.19**			**175.980**								**24.50**

ZONE 5	UPSTREAM CONTRIBUTIONS (ZONES): ZONES 3 & 4C					TOTAL A*C UPSTREAM		19.85									
ACCUMULATED CATCHMENTS									PIPE SIZING							TIME (TC)	
AREAS COMB.	FROM MH	TO MH	AREA (ha)	C	A*C	TOTAL A*C	I mm/hr	Q.req (m^3/s)	LENGTH (m)	SIZE (m)	SLOPE m/m	MANN n	VEL.des (m/s)	Q.des (m^3/s)	Q.req (m^3/s)	SECT min.	ACC min.
B4,5,6	302	501	4.20	0.40	1.68	21.53	47.3	**2.831**	92.940	1.200	0.00530	0.013	2.51	**2.838**	**2.831**	0.62	28.94
B16	501	502	4.06	0.22	0.89	22.42	46.6	**2.907**	149.000	1.200	0.00560	0.013	2.58	**2.918**	**2.907**	0.96	29.56
C1,2,3	502	503	2.99	0.00	0.00	22.42	45.6	**2.010**	102.350	1.050	0.00550	0.013	2.34	**2.025**	**2.010**	0.73	30.52
C4,5,6	503	504	1.87	0.40	0.75	23.17	44.9	**2.135**	138.190	1.200	0.00300	0.013	1.89	**2.135**	**2.135**	1.22	31.25
C7,8	504	505	2.58	0.40	1.03	24.20	43.8	**2.307**	88.730	1.200	0.00350	0.013	2.04	**2.307**	**2.307**	0.72	32.47
C9,10	505																
Totals			**15.70**			**24.20**			**571.210**								**32.47**

ZONE 8	UPSTREAM CONTRIBUTIONS (ZONES): NONE					TOTAL A*C UPSTREAM		0									
ACCUMULATED CATCHMENTS									PIPE SIZING							TIME (TC)	
AREAS COMB.	FROM MH	TO MH	AREA (ha)	C	A*C	TOTAL A*C	I mm/hr	Q.req (m^3/s)	LENGTH (m)	SIZE (m)	SLOPE m/m	MANN n	VEL.des (m/s)	Q.des (m^3/s)	Q.req (m^3/s)	SECT min.	ACC min.
C32	FUT	801	14.02	0.40	5.61	5.61	60.1	**0.937**	100.000	1.200	0.00100	0.013	1.09	**1.233**	**0.937**	1.53	20.00
C33	801	505	0.50	0.40	0.20	5.81	57.4	**0.927**	183.650	1.200	0.00100	0.013	1.09	**1.233**	**0.927**	2.81	21.53
	505																
Totals			**14.52**			**5.81**			**283.650**								**21.53**

INLET C1	UPSTREAM CONTRIBUTIONS (ZONES): ZONES 5, 8					TOTAL A*C UPSTREAM		30.01									
ACCUMULATED CATCHMENTS									PIPE SIZING							TIME (TC)	
AREAS COMB.	FROM MH	TO MH	AREA (ha)	C	A*C	TOTAL A*C	I mm/hr	Q.req (m^3/s)	LENGTH (m)	SIZE (m)	SLOPE m/m	MANN n	VEL.des (m/s)	Q.des (m^3/s)	Q.req (m^3/s)	SECT min.	ACC min.
C9,10	505	INLET C1	2.36	0.40	0.94	30.95	43.8	**3.765**	50.000	1.500	0.02700	0.013	6.58	**11.615**	**3.765**	0.13	32.47
	INLET C1																
Totals			**2.36**			**30.95**			**50.000**								**32.47**

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Minor Storm Sewer

Zones 1 Thru 5 and 8 Analysis

Figure -15

ZONE 7	UPSTREAM CONTRIBUTIONS (ZONES): NONE								TOTAL A*C UPSTREAM			0					
ACCUMULATED CATCHMENTS									PIPE SIZING							TIME (TC)	
AREAS COMB.	FROM MH	TO MH	AREA (ha)	C	A*C	TOTAL A*C	I mm/hr	Q.req (m^3/s)	LENGTH (m)	SIZE (m)	SLOPE m/m	MANN n	VEL.des (m/s)	Q.des (m^3/s)	Q.req (m^3/s)	SECT min.	ACC min.
C28,29	701	702	6.86	0.60	4.12	4.12	60.1	**0.688**	57.770	1.050	0.00100	0.013	1.00	**0.864**	**0.688**	0.96	20.00
C30,31	702	703	2.43	0.72	1.75	5.87	58.4	**0.952**	47.100	1.200	0.00120	0.013	1.19	**1.351**	**0.952**	0.66	20.96
C35	703	704	0.64	0.71	0.45	6.32	57.2	**1.006**	142.000	1.200	0.00100	0.013	1.09	**1.233**	**1.006**	2.17	21.62
C34	704	INLET C3	1.56	0.68	1.06	7.38	53.8	**1.104**	80.250	1.200	0.00120	0.013	1.19	**1.351**	**1.104**	1.12	23.79
	INLET C3																24.91
Totals			**11.49**			**7.38**			**327.120**								24.91

ZONE 6	UPSTREAM CONTRIBUTIONS (ZONES): NONE								TOTAL A*C UPSTREAM			0					
ACCUMULATED CATCHMENTS									PIPE SIZING							TIME (TC)	
AREAS COMB.	FROM MH	TO MH	AREA (ha)	C	A*C	TOTAL A*C	I mm/hr	Q.req (m^3/s)	LENGTH (m)	SIZE (m)	SLOPE m/m	MANN n	VEL.des (m/s)	Q.des (m^3/s)	Q.req (m^3/s)	SECT min.	ACC min.
C15,16,17	601	602	3.56	0.40	1.42	1.42	60.1	**0.238**	100.520	0.525	0.00360	0.013	1.19	**0.258**	**0.238**	1.40	20.00
C18	602	603	1.68	0.70	1.18	2.60	57.6	**0.416**	67.300	0.750	0.00150	0.013	0.98	**0.431**	**0.416**	1.15	21.40
C19,20	603	604	4.07	0.40	1.63	4.23	55.7	**0.655**	93.360	0.750	0.00350	0.013	1.49	**0.659**	**0.655**	1.04	22.55
C21,22,23,24	604	605	3.76	0.40	1.50	5.73	54.1	**0.862**	38.510	0.900	0.00230	0.013	1.37	**0.868**	**0.862**	0.47	23.60
C25,26	605	606	0.96	0.40	0.38	6.12	53.4	**0.908**	162.670	1.050	0.00120	0.013	1.09	**0.946**	**0.908**	2.48	24.07
C27	606	INLET C2	0.70	0.40	0.28	6.40	50.1	**0.891**	110.000	1.050	0.00120	0.013	1.09	**0.946**	**0.891**	1.68	26.55
	INLET C2																
Totals			**14.73**			**6.40**			**572.360**								**26.55**

ZONE 9	UPSTREAM CONTRIBUTIONS (ZONES): ZONES 6, 7, INLET C1								TOTAL A*C UPSTREAM			44.73					
ACCUMULATED CATCHMENTS									PIPE SIZING							TIME (TC)	
AREAS COMB.	FROM MH	TO MH	AREA (ha)	C	A*C	TOTAL A*C	I mm/hr	Q.req (m^3/s)	LENGTH (m)	SIZE (m)	SLOPE m/m	MANN n	VEL.des (m/s)	Q.des (m^3/s)	Q.req (m^3/s)	SECT min.	ACC min.
C36	OUTLET	BENTON	6.09	0.00	0.00	44.73	50.1	**0.267**	150.000	0.900	0.00100	0.013	0.90	**0.572**	**0.267**	2.78	26.55
	BENTON	EXST	0.00	0.00	0.00	44.73	46.9	**0.267**	410.000	0.900	0.00200	0.013	1.27	**0.810**	**0.267**	5.37	29.33
	EXST																
Totals			**6.09**			**44.73**			**560.000**								**29.33**

AECOM

Daytona Urban Development Corp
Copperwood, West Lethbridge
Outline Plan - Master Servicing Plan

Minor Storm Sewer
Zones 6, 7, and 9 Analysis
Figure - 16

B SIZE 11" x 17" (279.4mm x 431.8mm)

PLOT: 10/01/05 11:44:58 AM

ISS/REV: A
AECOM FILE NAME: G732-003-00_03-CPF007_RX.dwg Saved By: wallacee

LEGEND

- LIP OF GUTTER FLOW DIRECTION
- POINT OF VERTICAL INTERSECTION
- WET POND - HIGH WATER LEVEL (HWL)
- OVERLAND DRAINAGE SYSTEM ROUTE
- EMERGENCY OVERLAND DRAINAGE SYSTEM ROUTE

OVERLAND DRAINAGE TO NORTH

OVERLAND DRAINAGE TO SWMF #9

MULTI
1.88 ha

MULTI
1.69 ha

INSTITUTIONAL
1.73 ha

MULTI
1.66 ha

MANUFACTURED HOUSING

MULTI
1.59 ha

MULTI
2.02 ha

DRY POND A
PARK/SWMF
2.01 ha

DRY POND B
PARK/SWMF
2.87 ha

WET POND C
PARK/SWMF
5.12 ha

PLAYGROUND

(1.13 ha)

SCHOOL/PARK
3.94 ha

MULTI
1.56 ha

OUTLINE PLAN REVISION AREA
REFER TO APPENDIX 'G' IN THE
REVISED COPPERWOOD OUTLINE PLAN

SITE PLAN

0 50 100 m SCALE 1:5000

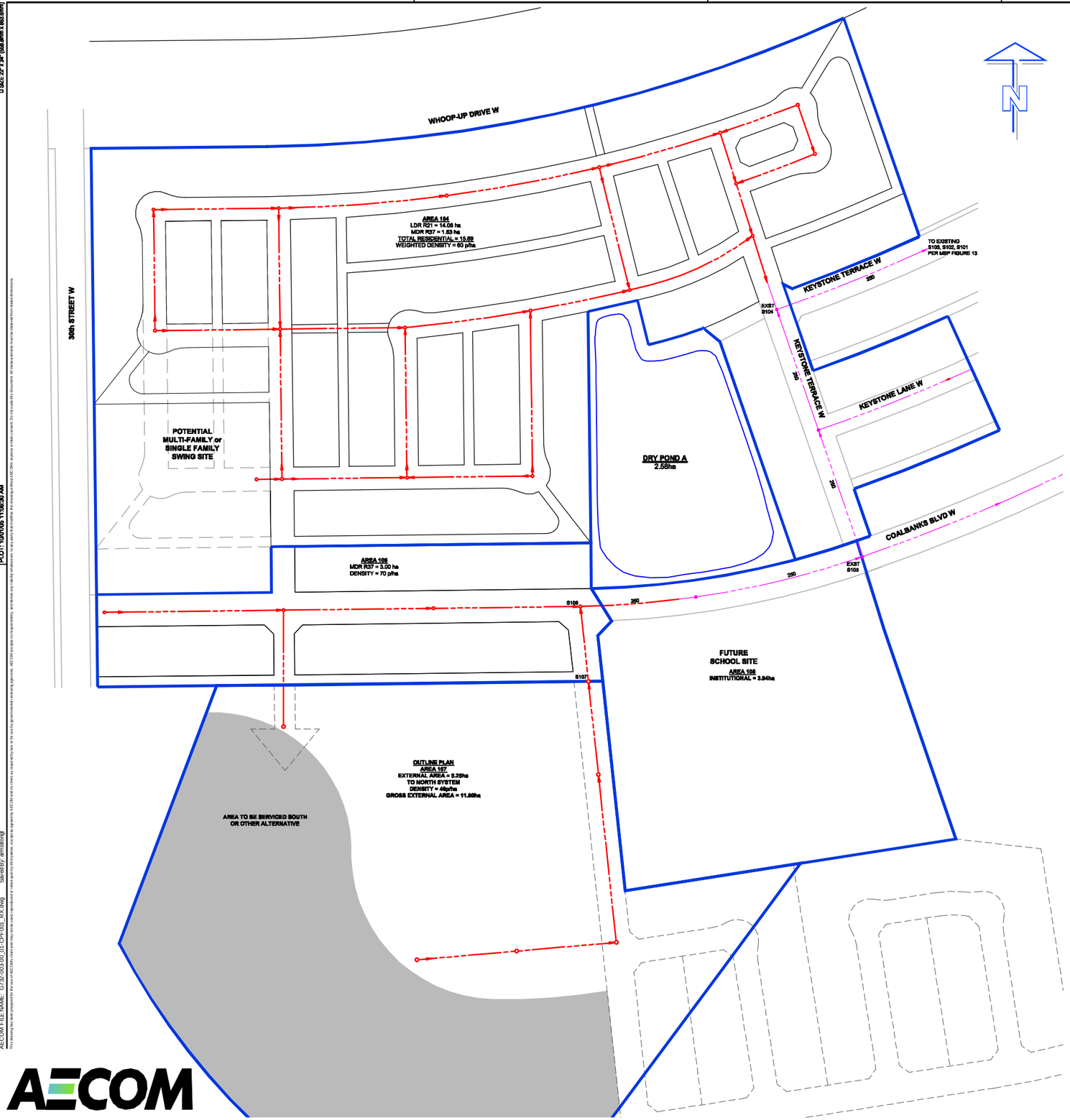
AECOM

Daytona Urban Development Corp.
Copperwood, West Lethbridge
Outline Plan - Master Servicing Plan

Master Grading Design and Overland Flow
Site Plan
Figure - 17

Appendix G

Northwest Copperwood land Use Revision



LEGEND

	NEW	EXISTING
SANITARY SEWER (SAN)		
FLOW DIRECTION		
MANHOLE		
MANHOLE NUMBER	S101	
SANITARY SEWER PIPE SIZE (Ø IN mm)	250	
AREA 100		
PEOPLE/HECTARE (p/ha)		

NOTES

1. **ALL SANITARY SEWER PIPES ARE Ø 200 UNLESS OTHERWISE INDICATED.**

LAND USE STATISTICS USED FOR ANALYSIS

POPULATION DENSITY BASED ON GROSS DEVELOPABLE AREA
USED FOR AREA 107 — 46 p/ha

POPULATION DENSITY BASED ON NET RESIDENTIAL AREAS
LOW DENSITY RESIDENTIAL (LDR R21) — 59 p/ha
MEDIUM DENSITY RESIDENTIAL (MDR R37) — 70 p/ha

AREA 1

RESIDENTIAL — Infiltration 0.15 m³/cap/day — Per Capita Dry Flow 0.400 m³/cap/day — Per Capita Wet 0.500 m³/cap/day

Area ID	From MH	To MH	Area ha	Pop Density pers/ha	Pop Increment	Cumulative Population	Dry Weather Flows: Flow Increment m³/day	Dry Weather Flows: Cumulative Avg. Flow m³/day	Dry Weather Flows: Peaking Factor	Dry Weather Flows: Cumulative Peak Flow m³/day	Wet: Cumulative Flow m³/day	Cumulative Infiltration m³/day	Cumulative Flow m³/day
107	S107	S106	5.25	46	241.50	241.50	96.60	96.60	4.12	397.71	120.75	36.23	**554.68**
106	S106	S105	3.00	70	210.00	451.50	84.00	180.60	4.00	721.79	225.75	67.73	**1015.26**
105	S105	S104	0.00	0	0.00	451.50	0.00	180.60	0.00	721.79	225.75	67.73	**1015.26**
104	S104	S103	15.69	60	941.40	1392.90	376.56	557.16	3.70	2062.94	696.45	208.94	**2968.32**
103	S103	S102	3.94	109	429.46	1822.36	171.78	728.94	3.62	2636.48	911.18	273.35	**3821.01**
102	S102	S101	12.06	64	771.84	2594.20	308.74	1037.68	3.50	3626.95	1297.10	389.13	**5313.18**

INSTITUTIONAL — WWF & Infiltration 9.75 m³/ha/day

Area ID	From MH	To MH	Area ha	Cumulative Area ha	Avg Unit Flow m³/day/ha	Flow Increment m³/day	Cumulative Avg. Flow m³/day	Peaking Factor AE 7.1.1.2(3)	Cumulative Peak Flow m³/day	Infiltration m³/day	Cumulative Flow m³/day
107	S107	S106	0.00	0.00	0.00	0.00	0.00	1.0	**0.00**	0.00	**0.00**
106	S106	S105	0.00	0.00	0.00	0.00	0.00	1.0	**0.00**	0.00	**0.00**
105	S105	S104	3.94	3.94	20.00	78.80	78.80	3.2	**251.95**	38.42	**290.37**
104	S104	S103	0.00	3.94	0.00	0.00	78.80	3.2	**251.95**	38.42	**290.37**
103	S103	S102	1.73	5.67	20.00	34.60	113.40	3.0	**341.07**	55.28	**396.36**
102	S102	S101	0.00	5.67	0.00	0.00	113.40	3.0	**341.07**	55.28	**396.36**

SEWER DESIGN

ZONES: Area ID	From MH	To MH	Sewer Length m	Cumulative Peak m³/d	Cumulative Peak L/s	PIPE SIZING: Sewer Diameter m	Slope m/m	Mannings n	Capacity Full Q=L/s	Velocity Full m/s	A.E. 7.2.1.2. Capacity Req=Peak/.86 Q=L/s
107	S107	S106	50.00	554.68	**6.4**	0.200	0.0040	0.013	**20.7**	0.66	7.5
106	S106	S105	200.00	1015.26	**11.8**	0.250	0.0030	0.013	**32.6**	0.66	13.7
105	S105	S104	180.00	1305.63	**15.1**	0.250	0.0030	0.013	**32.6**	0.66	17.6
104	S104	S103	270.00	3258.69	**37.7**	0.300	0.0025	0.013	**48.3**	0.68	43.9
103	S103	S102	90.00	4217.37	**48.8**	0.300	0.0040	0.013	**61.1**	0.86	56.8
102	S102	S101	150.00	5709.54	**66.1**	0.300	0.0091	0.013	**92.2**	1.30	76.8

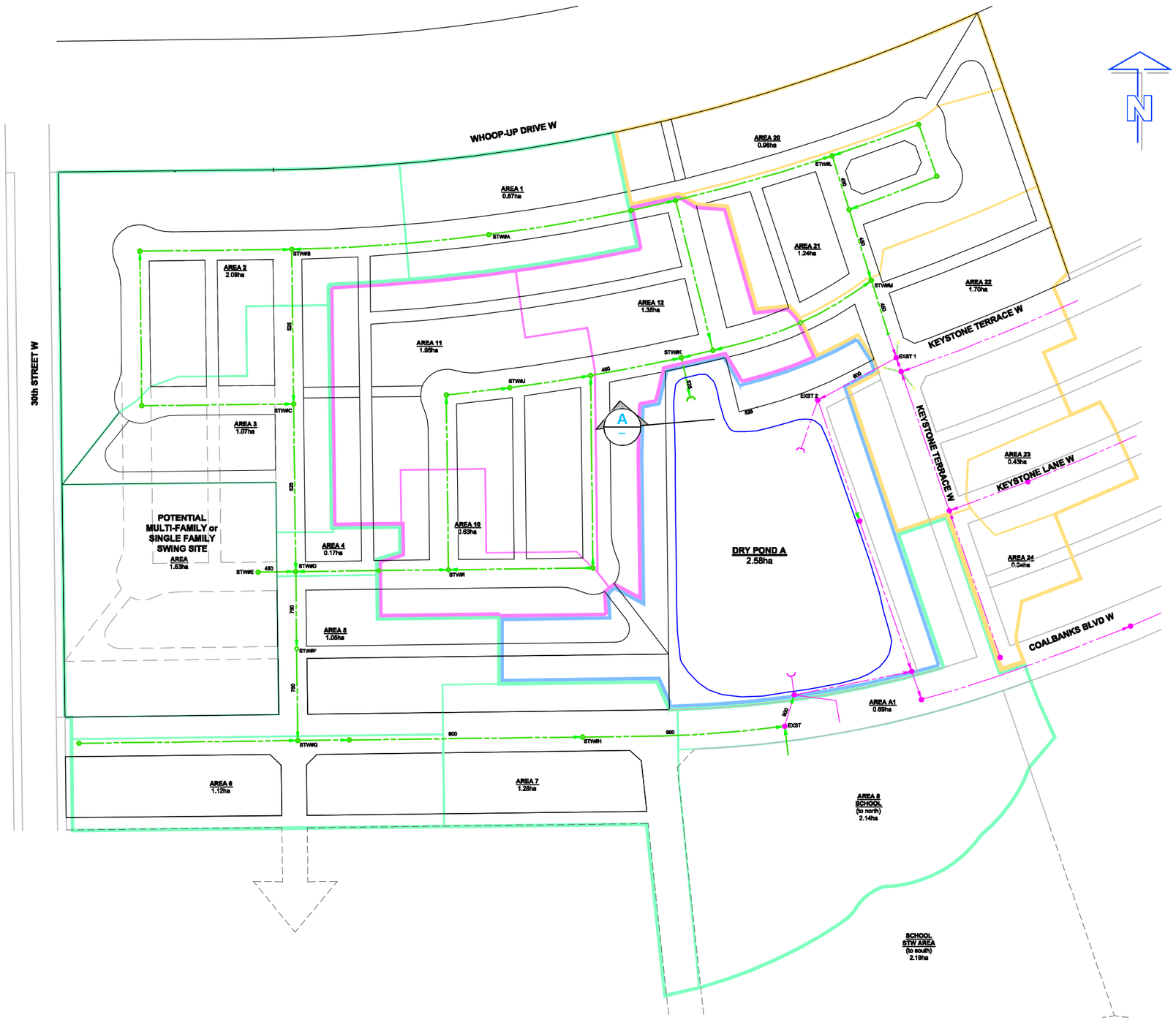
SCALE 1:1500
0 15 30 45 m
WHEN PLOTTED AT FULL SIZE

AECOM

Daytona Urban Development Corp
Northwest Copperwood
Land Use Revision

Sanitary Sewer System Site Plan

Figure - 1



LEGEND

	NEW	EXISTING
STORM SEWER (STW)		
MANHOLE		
FLOW DIRECTION		

ZONE A-A - 11.06 ha

ZONE A-B - 4.03 ha

ZONE A-C - 4.31 ha

ZONE A-POND - 3.14 ha

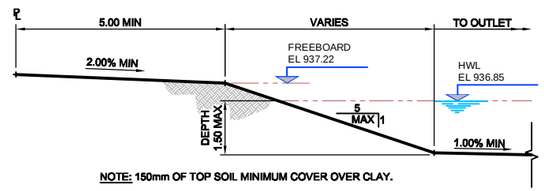
CATCHMENT AREA IDENTIFICATION — **AREA 1**

MANHOLE NUMBER — **STW#A**

STORM SEWER PIPE SIZE (Ø IN mm) — **1050**

NOTES

1. **ALL STORM SEWER PIPES ARE Ø 300 OR Ø 375 UNLESS OTHERWISE INDICATED.**
2. **ZONE A-POND INCLUDES THE POND AND BACK OF LOTS CONTRIBUTING TO THE POND AREA.**



NOTE: 150mm OF TOP SOIL MINIMUM COVER OVER CLAY.

SECTION A

H=1:100 V=1:200

TYPICAL POND 'A' SECTION

SCALE 1:1250

WHEN PLOTTED AT FULL SIZE

AECOM

Daytona Urban Development Corp
Northwest Copperwood
Land Use Revision

Minor Storm Sewer System Site Plan

Figure - 2

ZONE A1	UPSTREAM CONTRIBUTIONS (ZONES): NONE								TOTAL A*C UPSTREAM			0					
ACCUMULATED CATCHMENTS									PIPE SIZING							TIME (TC)	
AREAS COMB.	FROM MH	TO MH	AREA (ha)	C	A*C	TOTAL A*C	I mm/hr	Q.req (m^3/s)	LENGTH (m)	SIZE (m)	SLOPE m/m	MANN n	VEL.des (m/s)	Q.des (m^3/s)	Q.req (m^3/s)	SECT min.	ACC min.
1	A	B	0.87	0.40	0.35	0.35	60.1	**0.058**	113.290	0.300	0.00300	0.013	0.75	**0.053**	**0.058**	2.52	20.00
2	B	C	2.09	0.40	0.84	1.18	55.8	**0.184**	112.520	0.525	0.00200	0.013	0.89	**0.192**	**0.184**	2.11	22.52
3	C	D	1.07	0.40	0.43	1.61	52.6	**0.236**	71.580	0.525	0.00300	0.013	1.09	**0.236**	**0.236**	1.10	24.63
	D																25.72
Totals			**4.03**			**3.14**			**297.390**								25.72

ZONE A2	UPSTREAM CONTRIBUTIONS (ZONES): NONE								TOTAL A*C UPSTREAM			0					
ACCUMULATED CATCHMENTS									PIPE SIZING							TIME (TC)	
AREAS COMB.	FROM MH	TO MH	AREA (ha)	C	A*C	TOTAL A*C	I mm/hr	Q.req (m^3/s)	LENGTH (m)	SIZE (m)	SLOPE m/m	MANN n	VEL.des (m/s)	Q.des (m^3/s)	Q.req (m^3/s)	SECT min.	ACC min.
MULTI	E	D	1.63	0.40	0.65	0.65	60.1	**0.109**	87.000	0.450	0.00200	0.013	0.80	**0.128**	**0.109**	1.81	20.00
	D																21.81
Totals			**1.63**			**0.65**			**87.000**								21.81

ZONE A3	UPSTREAM CONTRIBUTIONS (ZONES): ZONE A1 and A2								TOTAL A*C UPSTREAM			3.79					
ACCUMULATED CATCHMENTS									PIPE SIZING							TIME (TC)	
AREAS COMB.	FROM MH	TO MH	AREA (ha)	C	A*C	TOTAL A*C	I mm/hr	Q.req (m^3/s)	LENGTH (m)	SIZE (m)	SLOPE m/m	MANN n	VEL.des (m/s)	Q.des (m^3/s)	Q.req (m^3/s)	SECT min.	ACC min.
4	D	F	0.17	0.40	0.07	3.86	51.2	**0.549**	44.670	0.750	0.00250	0.013	1.26	**0.557**	**0.549**	0.59	25.72
5	F	G	1.05	0.40	0.42	4.28	50.4	**0.599**	52.500	0.750	0.00300	0.013	1.38	**0.610**	**0.599**	0.63	26.31
6	G	H	1.12	0.50	0.56	4.84	49.6	**0.667**	163.100	0.900	0.00150	0.013	1.10	**0.701**	**0.667**	2.47	26.94
7	H	EXST	1.28	0.50	0.64	5.48	46.8	**0.713**	116.120	0.900	0.00200	0.013	1.27	**0.810**	**0.713**	1.52	29.41
8	EXST	POND	2.14	0.30	0.64	6.12	45.2	**0.769**	18.700	0.900	0.00200	0.013	1.27	**0.810**	**0.769**	0.24	30.93
Totals			**5.76**			**24.57**			**395.090**								30.93

ZONE BI	UPSTREAM CONTRIBUTIONS (ZONES): NONE								TOTAL A*C UPSTREAM			0					
ACCUMULATED CATCHMENTS									PIPE SIZING							TIME (TC)	
AREAS COMB.	FROM MH	TO MH	AREA (ha)	C	A*C	TOTAL A*C	I mm/hr	Q.req (m^3/s)	LENGTH (m)	SIZE (m)	SLOPE m/m	MANN n	VEL.des (m/s)	Q.des (m^3/s)	Q.req (m^3/s)	SECT min.	ACC min.
10	I	J	0.63	0.40	0.25	0.25	60.1	**0.042**	136.740	0.300	0.00200	0.013	0.61	**0.043**	**0.042**	3.72	20.00
11	J	K	1.95	0.40	0.78	1.03	53.9	**0.155**	99.850	0.450	0.00300	0.013	0.98	**0.156**	**0.155**	1.69	23.72
12	K	EXST 2	1.35	0.40	0.54	1.57	51.5	**0.225**	111.850	0.525	0.00300	0.013	1.09	**0.236**	**0.225**	1.71	25.42
	EXST 2																27.13
Totals			**3.93**			**2.86**			**348.440**								27.13

DRY POND A

DRY POND A RELEASE RATE OF 405 l/s
TO EXISTING SYSTEM

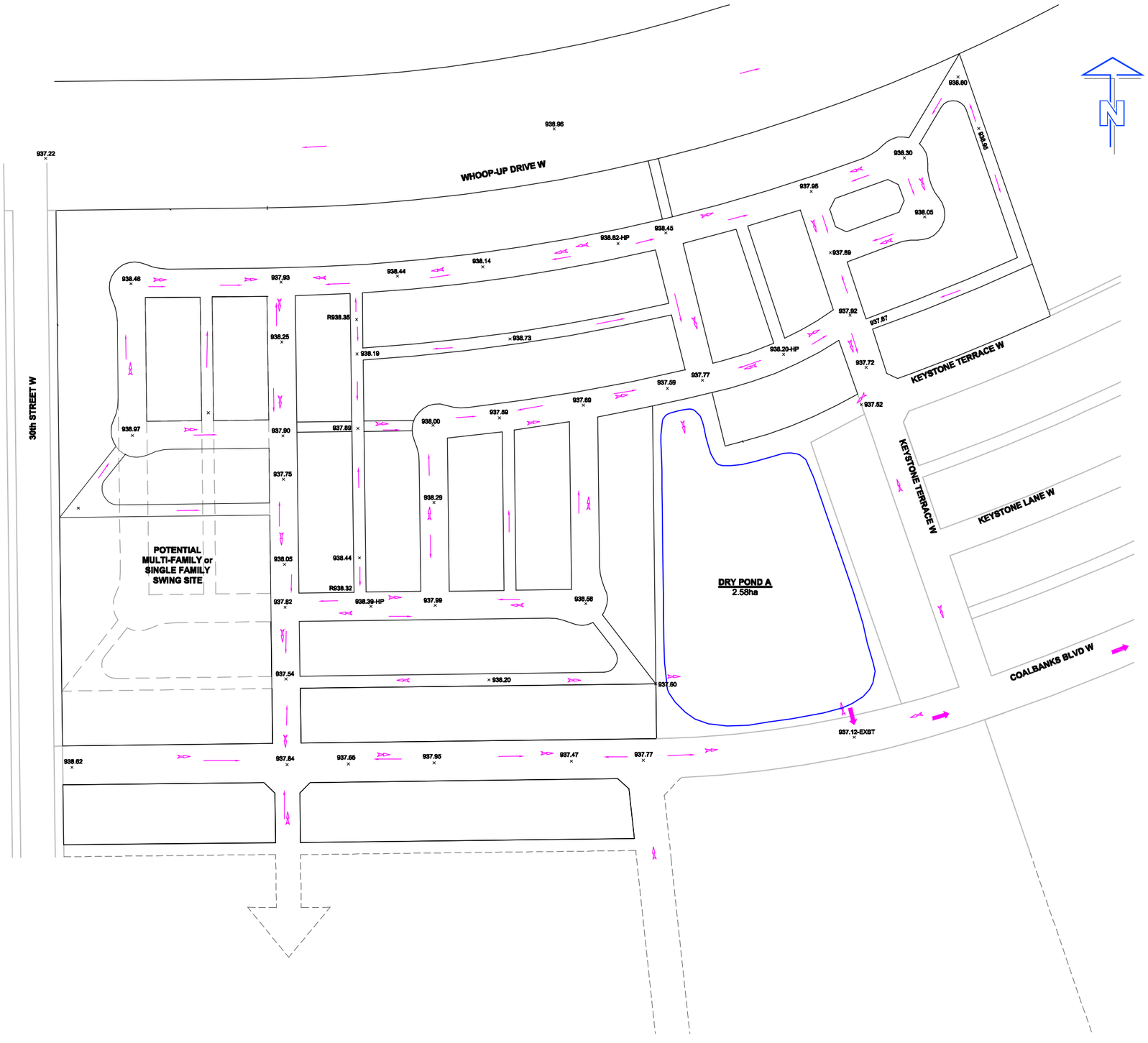
ZONE CI	UPSTREAM CONTRIBUTIONS (ZONES): NONE								TOTAL A*C UPSTREAM			0					
ACCUMULATED CATCHMENTS									PIPE SIZING							TIME (TC)	
AREAS COMB.	FROM MH	TO MH	AREA (ha)	C	A*C	TOTAL A*C	I mm/hr	Q.req (m^3/s)	LENGTH (m)	SIZE (m)	SLOPE m/m	MANN n	VEL.des (m/s)	Q.des (m^3/s)	Q.req (m^3/s)	SECT min.	ACC min.
20	L	M	0.96	0.40	0.38	0.38	60.1	**0.064**	32.310	0.450	0.00200	0.013	0.80	**0.128**	**0.064**	0.67	20.00
21	M	EXST 1	1.24	0.40	0.50	0.88	58.9	**0.144**	89.010	0.450	0.00250	0.013	0.90	**0.143**	**0.144**	1.65	20.67
22, 23, 24	EXST1	EXST2	2.47	0.40	0.99	1.87	56.1	**0.291**	51.170	0.600	0.00660	0.013	1.77	**0.499**	**0.291**	0.48	22.33
	EXST 2																22.81
Totals			**4.67**			**3.13**			**172.490**								22.81

AECOM

Daytona Urban Development Corp
Northwest Copperwood
Land Use Revision

Storm Water System Analysis

Figure - 3



LEGEND

- LIP OF GUTTER FLOW DIRECTION
- POINT OF VERTICAL INTERSECTION
- DRY POND - HIGH WATER LEVEL (HWL)
- OVERLAND DRAINAGE SYSTEM ROUTE
- EMERGENCY OVERLAND DRAINAGE SYSTEM ROUTE

NOTES

1. **GRADING ELEVATIONS ARE CONCEPTUAL.**

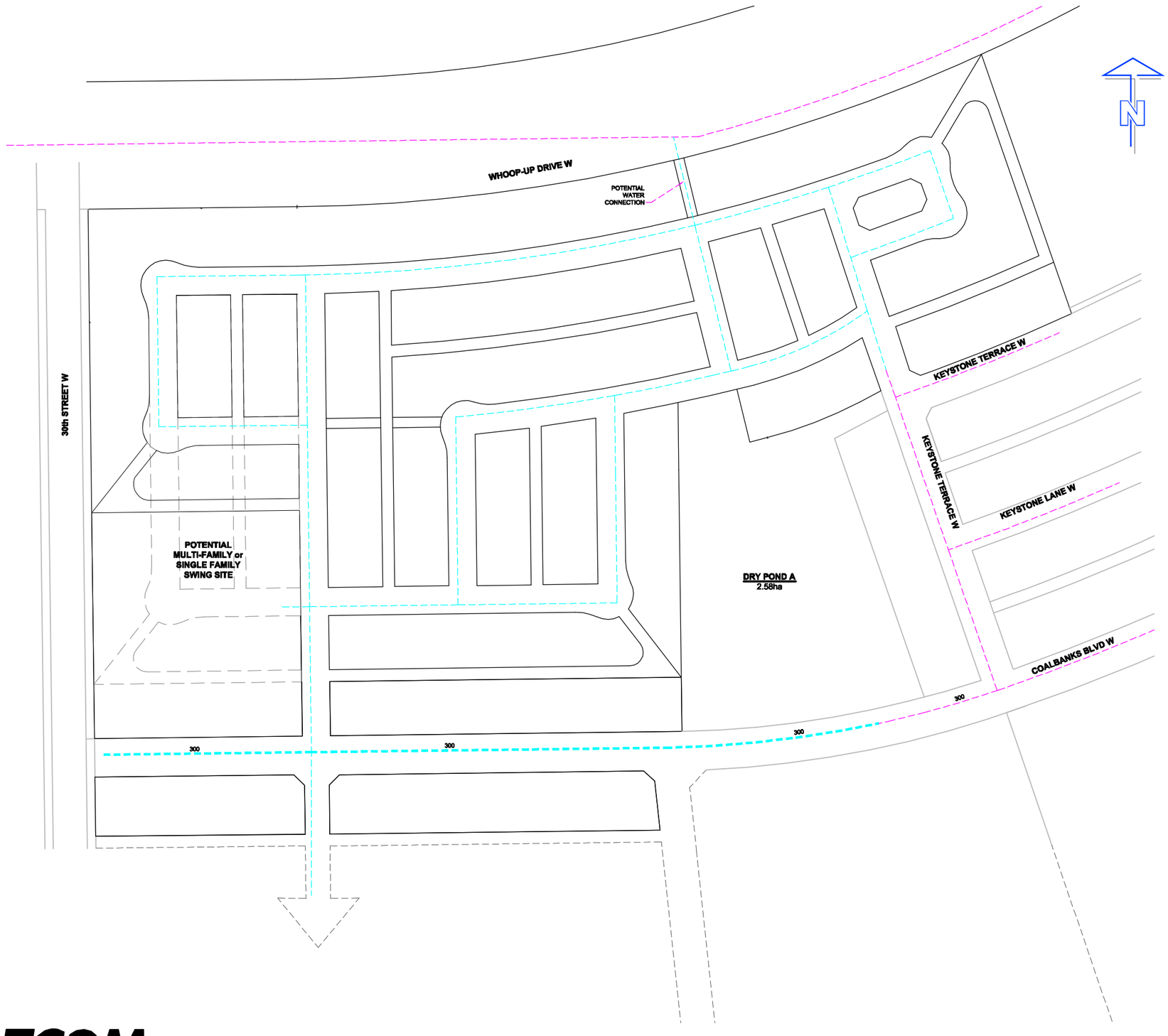
m SCALE 1:1250
0 12.5 25 37.5
WHEN PLOTTED AT FULL SIZE

AECOM

Daytona Urban Development Corp
Northwest Copperwood
Land Use Revision

Master Grading Design and Overland Flow Site Plan

Figure - 4



LEGEND

NEW WATERMAIN	
EXISTING WATERMAIN	
WATERMAIN SIZE (mm)	300

NOTES

1. **ALL WATER MAINS ARE Ø 200 UNLESS OTHERWISE INDICATED.**

m SCALE 1:1250
0 12.5 25 37.5
WHEN PLOTTED AT FULL SIZE

AECOM

Daytona Urban Development Corp
Northwest Copperwood
Land Use Revision

Water Distribution System Site Plan

Figure - 5