CITY OF MELBOURNE

COMPREHENSIVE PLAN
CHAPTER V
INFRASTRUCTURE ELEMENT

Data and Analysis

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DRAFT

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DATA AND ANALYSIS
INFRASTRUCTURE ELEMENT

A. INTRODUCTION

It is the purpose of the infrastructure element to describe the existing and proposed sanitary sewer (including water reclamation), solid waste, drainage, and potable water facilities and services in the Melbourne area, and to correlate these facilities and services to future land use projections. It is also the purpose of this element to describe the existing natural groundwater aquifer recharge system, and to correlate this system with future land use goals and objectives.

Each component of this diverse element will be addressed in the sequence noted below:

Sanitary Sewer
Solid Waste
Drainage
Potable Water
Natural Groundwater Aquifer Recharge

Each component of the Infrastructure Element is drafted to stand separately with its individual tables, maps and exhibits. All maps are to be found in the Map Atlas of the Comprehensive Plan.

B. SANITARY SEWER SUB-ELEMENT, DATA AND ANALYSIS

1. Existing Conditions.

As defined by Chapter 9J-5, Florida Administrative Code (FAC), sanitary sewer facilities are "structures or systems designed for the collection, transmission, treatment, and disposal of sewage, and include trunk mains, interceptors, treatment plants, and disposal systems".

The City of Melbourne is currently the entity having operational responsibility for the sanitary sewer system serving most of the developed areas within the city limits. One exception is the incorporated area on the beachside, most of which is served by the South Beaches Sewer System owned and operated by Brevard County, and a second is the small area of the city located north of Post Road and west of the Florida East Coast Railway.

The geographic area and land uses served by the city's sanitary sewer system are described later in this element in conjunction with discussions on the treatment plants and collection systems. Much of the following information is derived from data contained within the City's draft Wastewater Collection Master Plan as prepared by Reiss Engineering, Inc., in January 2009. This Plan will be finalized prior to the adoption of the City's EAR based amendments. The completed plan will be included as data and analysis at the adoption phase of these amendments.

a. Water Reclamation Facilities.

The City of Melbourne currently owns and operates two (2) water reclamation facilities (WRF):

- Grant Street WRF.
- David B. Lee WRF.

These facilities are described in detail below in terms of the following:

- Geographic service area.
- Types of land uses served.
- Design capacity.
- Current demand and level of service.
- Plant performance.
- Impact on adjacent natural resources.

(1) Grant Street WRF.

Geographic service area - The Grant Street WRF serves the area of the city generally lying south and east of the Melbourne International Airport. The service area is bounded on the north by Brevard Drive and Hibiscus Boulevard, on the west by Evans Road and Dairy Road, on the south by Palm Bay Road, and on the east by the Indian River (see Map V-1, of the Map Atlas).

Types of land uses served - Over fifty percent (50%) of the land in the Grant Street WRF service area is residential. More than 10% of the area remains undeveloped, with the remaining land divided among commercial, institutional and recreational uses.

Design capacity - The Grant Street WRF initially began operation in 1964. Multiple phases of improvements have been completed over the years which provided additional process component redundancy and increased permitted capacity to 5.5 MGD. These improvements have increased capacity and efficiency in treatment, secondary effluent transfer pumping, deep injection well pumping and reuse pumping. The facility produces an average of approximately 0.24 MGD of highly treated reclaimed water to a non-restricted public access reuse irrigation system consisting of the Crane Creek Reserve Golf Course, residential homes, and commercial/industrial area green space. Design of additional reclaimed water production and distribution improvements, as well as emergency power facilities is also nearing completion. The deep injection well has a design capacity of 14.92 MGD, and handles the combined secondary effluent from both of the city's treatment facilities.

Current demand and level of service - The Grant Street WRF can currently accommodate 5.5 MGD. The most recent average daily flow to the facility was 3.10 MGD (based on a twelve-month running flow average through October 2008). Concurrency approved and allocated treatment capacity commitments for the Grant Street facility amount to 1.23 MGD, thereby leaving an available capacity of 1.17 MGD. The adopted level of service standard for the Grant Street service area is 100 gallons per day per person.

Plant performance - Monthly operating reports through October 2008 indicate that the Grant Street plant is meeting the state's secondary treatment criteria for Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS) for discharge to its deep injection well. In addition, the quality of the reclaimed water is currently meeting all regulatory criteria for use in a non-restricted public access reuse system. A 2.5 MGD capacity expansion project is scheduled for design in fiscal year 2012-2013.

The Grant Street facility is currently operating under an FDEP operation permit (No. FL0041122). In addition, the facility has an NPDES "no discharge" permit (No. 05-0187420-001) issued by USEPA for use when a Mechanical Integrity Test (MIT) is performed on the deep injection well and, at that time, all effluent from the city's facilities is disposed via surface water discharge to Crane Creek. The next MIT is scheduled to be conducted in March, 2009.

Impact on adjacent natural resources - The Grant Street facility no longer discharges treated effluent to surface water bodies on a daily basis. All effluent is either sent to the reclaimed water system, or is disposed via deep well injection. During the conducting of the MIT on the deep injection well, the city is allowed to discharge highly treated effluent to Crane Creek via the NPDES permit as discussed above.

(2) David B. Lee WRF.

Geographic service area - The David B. Lee WRF currently serves the north portion of the City of Melbourne. The service area is currently bounded by the north side of the Sherwood Park subdivision and Post Road on the north, Interstate 95 on the west, the Melbourne International Airport and Brevard Drive on the south, and the Indian River on the east (see Map I-1). Also included is some sanitary and industrial flow from along John Rodes Boulevard south of Sarno Road and along U.S. 192.

Types of land uses served - Most of the land use served by the David B. Lee facility is residential, with some commercial and a small, but increasing, amount of industrial.

Design capacity - The David B. Lee WRF was originally constructed and put into operation in 1957. Multiple phases of improvements have been completed over the years, which provided additional process component redundancy and increased permitted capacity to 7.0 MGD. The facility produces an average of approximately 2.33 MGD of highly treated reclaimed water to a non-restricted public access reuse irrigation system consisting of the Mallards Landing Golf Course, residential homes, and commercial/industrial area green space. The balance of effluent is sent to the Grant Street facility for disposal via deep well injection.

Current demand and level of service - The most recent average daily flow to the D.B. Lee facility was 4.47 MGD (based on a twelve-month running flow average through October 2008). Concurrency approved and allocated treatment capacity commitments for the D.B. Lee facility amount to 0.99 MGD, thereby leaving an available capacity of 1.53 MGD. The adopted level of service standard for the D.B. Lee service area is 100 gallons per day per person.

Plant performance - Monthly operating reports through October 2008 indicate that the D.B. Lee facility is meeting the state's secondary treatment criteria for Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS) for discharge to the deep injection well. In addition, the quality of the reclaimed water is currently meeting all regulatory criteria for use in a non-restricted public access reuse system. A 2.5 MGD capacity expansion project is scheduled for design in fiscal year

2009-2010 and construction in fiscal year 2011-2012. The D.B. Lee facility is currently operating under FDEP Operating Permit No. FLA010323.

Impact on adjacent natural resources - The D.B. Lee facility does not discharge treated effluent to surface water bodies. All effluent is either sent to the reclaimed water system, or is transferred to the Grant Street facility for disposal via deep well injection.

b. Collection System.

The wastewater collection system consists of gravity mains and manholes that collect wastewater from homes and businesses. The collection gravity mains flow by engineered gravity grade to larger collector gravity mains or lift station wet wells. The City's collection system that flows to DB Lee WWTF has some larger (12 and 15 inch) gravity mains but is primarily pumped to the plant via lift stations and force mains. Conversely, the City's Grant Street WWTF collection system flows primarily to the plant via large (up to 36 inch) gravity mains. The collection system for the City of Melbourne has roughly 1,500,000 feet of gravity mains that vary in size from 6 inch to 42 inch in diameter and also has over 6,000 manholes. The gravity mains were categorized into five pipe material categories and an unknown category as presented in Table 2-1. The City has an ongoing program to line gravity pipes to reduce infiltration, improve structural stability and extend pipe service life using Insituform Technologies Inc. cured in place composite pipe liner product.

Table SS-1. Length and Material of Gravity Mains in Collection System

Material	Length (ft.)		
	Total	Lined	Unlined
Cement Asbestos	4,291	676	3,615
Cast Iron	7,061	349	6,712
Ductile Iron	11,863	5,836	6,027
PVC	475,701	1,701	474,000
Unknown	236,610	25,277	211,333
Vitrified Clay	781,933	90,234	691,699

Where grade or existing infrastructure does not permit gravity flow all the way to the treatment facility, collection system flows discharge into lift station wet wells for pumping through force mains to WWTFs or other transmission systems. The collective lift stations and force main infrastructure are referred to as wastewater transmission systems. The transmission system for the City of Melbourne has over of 300,000 feet of force mains, 91 pump stations and 32 private lift stations. The force mains include six pipe material categories as listed in Table 2-2.

Table SS-2. Length and Materials of Force Mains in Transmission System

Material	Length (ft.)

Cement Asbestos	6,822
Cast Iron	54,640
Ductile Iron	13,342
Pre-Stressed Concrete	14,474
PVC	193,648
Unknown	20,973
Vitrified Clay	817

There are currently 32 private lift stations and associated force mains that discharge into the City's wastewater reclamation facilities. The private lift stations are primarily relatively low flow commercial stations but do include several small residential neighborhoods. The City does not track data on these stations and evaluation of private facilities was outside of the scope of this project. To estimate impacts on downstream City collection and transmission facilities, private system flows were estimated based on water meter records, however, several of the stations did not have transferable water meter flows resulting in zero flow for the station. Generally, the impact of these private stations is small, however, more significant stations or ones with I&I issues could have an impact on the City's receiving infrastructure. It was noted during a field visit that a private company services some of the private lift stations in the City's service area. Additionally, City engineering staff likely has design flow and head information as part of development submittals. Future information gathering efforts could potentially tap such maintenance sources for information on private lift station pump data.

c. Effluent Disposal.

The treated wastewater effluent disposal methods currently used by the city are briefly described below.

Deep well injection - Injecting secondary treated wastewater effluent into deep wells is an accepted method of effluent disposal. Disinfection is not required prior to injection; however, those who obtain deep well injection permits must be capable of meeting criteria for alternative disposal methods. The city currently injects approximately 5.0 MGD (average daily flow) of secondary effluent into a 24-inch deep injection well located at the Grant Street facility. The deep injection well has a total capacity of 14.92 MGD.

Reuse/land disposal system - Reuse of highly treated and disinfected wastewater effluent via a slow-rate land application system is another accepted method of effluent disposal which is employed by the city. Such land application systems are used to irrigate areas having restricted public access (such as sod farms, forests, crop lands or pasture lands), as well as those areas that are accessible to the public (such as golf courses, parks, and landscaped areas). The city presently produces approximately 2.57 MGD of reclaimed water based on the twelve month period ending October 2008. The city's reclaimed system currently serves over 700 residential and commercial customers, including Mallard's Landing and Crane Creek Reserve Golf Courses.

The city continues to actively pursue the expansion of the reuse system in order to reduce reliance on the deep injection well and to preserve natural resources.. A consultant recently completed a reuse production and s study, which identified phased improvements through 2017.

d. Septic Tanks.

Collection of raw wastewater in the city is handled primarily through central sewer systems, as previously described. Some older sections of the city do have neighborhoods which are served by septic tanks that were installed prior to the initiation of central sewer service. Other areas which are over 300 feet from a sanitary sewer line have obtained septic tank permits, although the city discourages the use of septic tanks.

New permits for septic tanks are scarce, with the bulk of recent permits being for temporary tanks. In some cases, dry sewer lines are installed and the developer is required to disconnect the septic tank system as soon as connection to the central sewer system is feasible.

Older septic tank systems are generally performing well in the area, with a normal level of repair permits being issued for failing systems that are unable to be served by the central sewer system.

The vast majority of soils in Melbourne and most of the coastal area have severe limitations for septic tanks, due to high, fluctuating water tables. Areas with soil types having severe limitations for septic tanks are shown in Map V-2 of the Map Atlas. Septic tanks are feasible in these soils, and permits are issued when soil conditions are corrected through replacement and/or when drainfields are elevated. Mapping of specific soil types is available from the Soil Conservation Service.

e. Wastewater Biosolids Handling.

The biosolids produced by the city's water reclamation facilities are stabilized via aerobic digestion, lime stabilization, and belt filter press dewatering, with final disposal via land application to FDEP approved pasture lands. Currently, Class B solids which meet the provisions of 40 CFR 503 and Chapter 62-640 of the FAC are being produced and applied to the city's land application sites.

2. Future Conditions.

a. Population Projections

Population projections were developed for the City of Melbourne’s wastewater service area using University of Florida Bureau of Economic and Business Research (BEBR) population projections and disaggregated into traffic analysis zones (TAZ) and pump station areas using Brevard Metropolitan Planning Organization’s (MPO) population data prepared in 2008 for their Long Range

Transportation Plan. The Brevard MPO projections used for disaggregation were provided for years 2015 and 2035. REI overlayed the TAZs on the Melbourne wastewater service area map and adjusted the BEBR population projections to only include the population inside the City's wastewater service area. A summary of the resulting residential population projections is provided in Table SS-3. Non-residential populations (students, employees, customers) were also tallied from the Brevard MPO TAZ data.

Table SS-3. Melbourne Wastewater Service Area Population/Flow Projection Summary

Service Area	Year				
	2007	2010	2015	2020	2035
Total City Wastewater Served					
Single Family Population			43,264		56,264
Multi-Family Population			20,854		23,531
Total Residential Population	57,778	59,943	64,119	68,368	79,795
Industrial Employees			7,407		16,399
Commercial Employees			9,513		15,341
Service Employees			35,826		50,984
School Enrollment			27,157		28,726
Hotel-Employees/Guests			1,434		6,232

b. Septic Conversions

Some residents inside the City's utility service area have septic tanks that provide onsite treatment and disposal. The septic tanks are primarily in residential, low density areas that did not have central sewer service available when development occurred. In the northwestern part of the City, low density lots (~1 acre) make central sewer much less cost effective, because of the physical distance between lots and restoration costs, and customers have indicated to the City a desire to stay on septic tanks; therefore, the northwest area of the City will almost certainly remain on septic tanks. Potential areas that could be converted include the unincorporated enclave areas within the City.

c. Sewage Flow Projections

An assessment of wastewater flows for the past year (2007) indicated the average residential daily flow generation per capita was approximately 100 gallons. Flow projections were also assigned to the City's WWTF's using the hydraulic model and compared to WWTF capacity. The resulting flow projections for the entire City wastewater service area are graphically compared to the historical wastewater flows in Figure SS-1.

The associated three-month average daily flow (TMADF) for wastewater (the design basis for wastewater treatment facilities) is expected to rise from a current level of 8.58 MGD to 13.06 MGD by 2035 as summarized in Table SS-4. The City's growth is expected to occur in the western annexation areas and infill areas

inside the City, and growth rates will be subject to change based on economic conditions.

Figure SS-1. Wastewater Flow Projection Summary

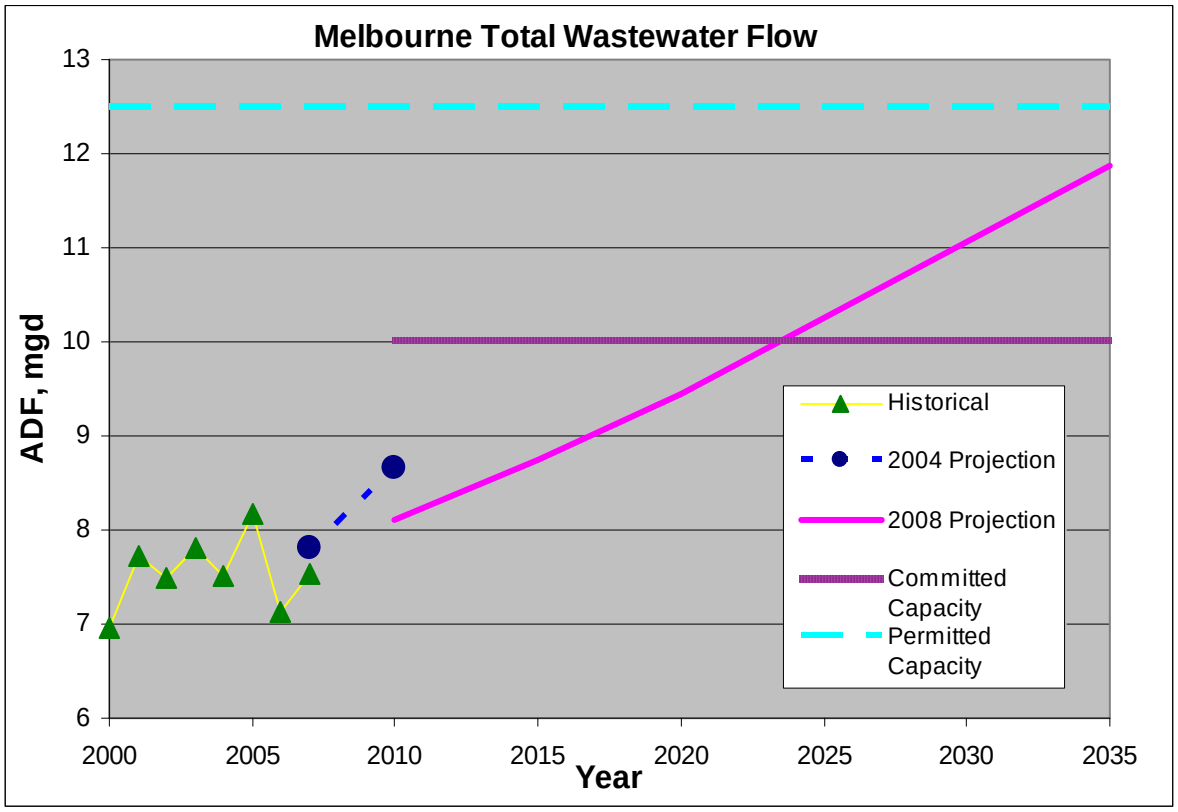

Table SS-4 Wastewater Flow Projections

Service Area	Year				
	2007	2010	2015	2020	2035
Total City					
Served Residential Population	57,778	60,000	64,712	70,000	87,916
Total Wastewater AADF, mgd	7.80	8.10	8.74	9.45	11.87
Wastewater TMADF, mgd	8.58	8.91	9.61	10.40	13.06
DBLee WWTF					
Served Residential Population	32,593	33,333	36,564	40,370	56,805
Wastewater AADF, mgd	4.40	4.50	4.94	5.45	7.67
Wastewater TMADF, mgd	4.84	4.95	5.43	6.00	8.44
Grant St WWTF					
Served Residential Population	25,185	26,667	28,148	29,630	31,111
Wastewater AADF, mgd	3.40	3.60	3.80	4.00	4.20
Wastewater TMADF, mgd	3.74	3.96	4.18	4.40	4.62

d. Deep Well Injection.

With a total capacity of 14.92 MGD, the deep well injection at the Grant Street facility is expected to continue serving as the primary effluent disposal means for the city for the foreseeable future. A total wastewater flow of approximately 9.5 MGD is projected for the two service areas as of the end of the planning increment (i.e., year 2015). Of this flow, it is projected that a maximum of only 6.5 MGD is expected to be deep well injected on an average daily basis because of the city's plan to maximize the use of the 3.0 MGD capacity reuse system. This amount should be further reduced through the city's plans to continue the expansion of the reuse system. Therefore, the capacity of the deep well injection is not expected to be exceeded during the planning period.

e. Effluent Reuse

The city continues to actively pursue the expansion of its reuse systems. There are two effluent reuse areas established for the reuse program:

North Service Area - That tract of land bounded on the north by the Pineda Causeway, on the east by the Indian River, on the south by U. S. 192, and on the west by Interstate 95, less and except those parcels outside the corporate limits of the City of Melbourne.

South Service Area - That tract of land bounded on the north by U. S. 192, on the east by the Indian River, on the south by Palm Bay Road; west of Interstate 95, less and except those parcels outside the corporate limits of the City of Melbourne.

f. Percolation Ponds.

The city discontinued the use of the percolation pond system at the D. B. Lee facility in 1990. The land was returned to its original condition in 1994. Future expansion of the D.B. Lee facility is expected to take place on this land.

g. Wastewater Biosolids Handling/Disposal.

The wastewater biosolids produced at the city's wastewater facilities are stabilized using aerobic digestion, dewatered using belt filter presses, then further stabilized using the lime stabilization process. Class B solids are produced which are in turn land-applied to FDEP approved land application sites consisting mainly of pasture lands.

3. Planned Improvements.

Aside from completing the wastewater facility, reuse facility and distribution system, and collection system improvements currently under construction or scheduled for completion, the City of Melbourne has no other planned improvements. Future planned improvements will be determined at a later date as needs and conditions are identified, as the master plans are updated, and as amendments to this element of the Comprehensive Plan are adopted.

C. SOLID WASTE MANAGEMENT SUB-ELEMENT, DATA AND ANALYSIS

1. Existing And Future Conditions.

a. Solid Waste Disposal.

Chapter 9J-5 FAC defines solid waste as "sludge from a waste treatment works, water supply treatment plant or air pollution control facility; or garbage, rubbish, refuse or other discarded material, including solid, liquid, semisolid or contained gaseous material, resulting from domestic, industrial, commercial, mining, agricultural or governmental operations." Solid waste facilities are defined by 9J-5 FAC as "structures or systems designed for the collection, processing or disposal of solid wastes (including hazardous wastes), and include transfer stations, processing plants, recycling plants and disposal systems".

Brevard County handles all solid waste disposal for the Melbourne planning area. All Class I solid waste (municipal solid waste) is transferred from the Melbourne Planning Area to the Central Disposal Facility in Cocoa for disposal.

The status of the various disposal facilities within the County is shown in Table SW-1 and Map V-4 and represents the most recent available assessment of the respective facilities and their present or proposed capacities. The County is in the process of permitting a new solid waste disposal facility for the disposal of solid waste generated in South Brevard, including Melbourne. This facility will be located in western Brevard on U.S. Highway 192. This facility is expected to be operational for yard waste and Class III material by 2013.

Class III solid waste (construction and demolition debris) generated in the Melbourne area is disposed of in the Sarno Road Landfill which is estimated to reach current permitted capacity in 2010. The County has been granted a permit by FDEP that would allow the Sarno site to be expanded by the County into a 9.5 acre area between the existing County landfill and an adjacent privately operated landfill, which would increase its service life to 2014. The County is currently in discussions with the City regarding a Conditional Use Permit application for the proposed expansion area.

The County has plans to build a new Household Hazardous Waste Facility at the Sarno Road landfill in order to better serve south county residents, to include the City of Melbourne. A permit application has been submitted to the City of Melbourne for approval.

The County’s failure to obtain the above mentioned permits for either site would require solid waste haulers to transport all class III solid waste to the Central Disposal Facility in Cocoa.

Disposal of sewage sludge by an alternative method was identified in the County Solid Waste Plan as an area of needed improvement. The city had been hauling

the sludge to the landfill at a volume of 30 wet tons per day. This practice ended in 1990. The wastewater component of the Infrastructure Element addresses the measures taken to dispose of the sludge presently and into the future.

b. Solid Waste Collection.

Solid waste collection is accomplished with a franchise agreement with Waste Management. The franchisee has the sole and exclusive right to collect refuse from residential units, multiple family dwelling units, commercial establishments, and industrial establishments, within the city, subject to the Solid Waste Management Act, Section 403.7046, Florida Statutes, as amended from time to time with the following exceptions:

(i) Commercial establishments or industrial establishments which transport refuse with their own vehicles; and
(ii) Firms engaging in building or remodeling activities requiring a city building permit shall be permitted to remove the construction and demolition debris accumulated as a result of their operations, provided the construction and demolition debris are stored, transported and disposed of in a manner which is approved by the city manager or his designated representative.

Such approval shall be evidenced by a permit issued by the city manager or his designated representative.

Residential and multiple family dwelling units are billed for solid waste and recycling collection service on their utility bill which is processed by the city's accounting department. Commercial and industrial accounts are billed directly by Waste Management who pays the city a billing fee and a franchise fee. The current contractual agreement between the city and Harris Sanitation, Inc. expires September 30, 2010 and can be automatically renewed for another five years.

c. Recycling.

A need was identified in The County Solid Waste Plan to establish and manage a Solid Waste Recycling Program. The program was established and has performed beyond expectation. The Environmental Community Outreach (ECO) Division has been responsible for planning, developing, expanding, and coordinating the Solid Waste Recycling Program for the city, which has been in effect since 1989. The volume of recycled materials compared to the waste stream are shown in Table SW-1. The recycling program has been responsible for keeping approximately 8% of additional waste from being part of the waste stream from 2003 to 2007.

Table SW-1
REMOVED FROM WASTE STREAM AS A PERCENTAGE OF TOTAL

	Garbage	**Yard trash**	**Recycled**	**Total Solid**	**% Removed**
2003	31,252	2,260	3,346	36,858	9.1%

2004	33,920	2,849	3,124	39,893	7.8%
2005	31,808	12,874*	3,500	48,182	7.3%
2006	28,708	9,817**	2,762	41,287	6.7%
2007	26,729	8,311	3,614	38,654	9.3%

* Caused by Hurricanes Frances and Jeanne, which damaged many trees.

** Cause by Hurricane Wilma, which damaged trees

Currently, the curbside recycling collection is done by the franchised hauler. In June 2006, the City began a new recycling program that allowed more items to be recycled and began a single-stream collection of the materials. The commodities that are collected curbside include newspaper and inserts, phone books, magazines, junk mail and envelopes, paper bags, paperboard boxes, milk and juice cartons. In addition, plastic and glass bottles, and aluminum, tin and steel cans can be recycled in the curbside collection. Plastic containers used for packaging pesticides, oils, and chemicals are excluded. The city's curbside program is augmented with five (5) drop-off locations for corrugated cardboard that are provided by Waste Management. Commercial and industrial establishments who voluntarily recycle may choose any hauler to collect their recyclable materials.

The goal in Brevard County was a 30% reduction in solid waste entering the landfill by December 1994. The city's share of this goal was both achieved and exceeded. The 2008 Florida Energy Bill (House Bill 7135) signed into law by Governor Crist created Section 403.7032, Florida Statutes. This establishes a new statewide recycling goal of 75% to be achieved by the year 2020. The Department of Environmental Protection shall develop a comprehensive recycling program that is designed to achieve the percentage under subsection (2) and submit the program to the President of the Senate and the Speaker of the House of Representatives by January 1, 2010. The program may not be implemented until approved by the Legislature. The program must be developed in coordination with input from state and local entities, private businesses, and the public. Efforts to educate and promote recycling to the business community will continue into the future.

d. Summary of Current and Future Conditions.

Brevard County has responsibility for solid waste transfer and disposal, and the responsibility of financially supporting the needed facilities. The geographic areas served in the Brevard County are shown in Map V-4 which also indicates the extent of the Melbourne Planning Area. The predominant land use served is residential. Table SW-2 shows the capacity and expected life of the facilities within the county. The solid waste collection contractor's routes cross a number of municipal boundaries and therefore it is not clear how much solid waste is contributed by the respective jurisdictions. The FDEP data through 2006, shows the current Brevard County level of municipal solid waste disposal is 1.58 tons per capita per year, or 8.67 pounds per day.

TABLE SW-2
BREVARD COUNTY SOLID WASTE MANAGEMENT FACILITIES
TOTAL, PERMITTED AND POTENTIAL

Solid Waste Management Facility		***Permitted Disposal Area***				***Un-permitted Potential Disposal Area***		
	Total Acreage	***Operational Capacity (tons/day)***	***Disposal Acreage***	***Remaining Capacity* (Volume)***	***Closure Date***	***Acreage***	***Additional Capacity***	***Closure Date***
Central Disposal Facility	957	2,500 tons/day	190	5,081,963	2013	220	20,000,000	2040
Sarno Road Landfill	167	1,600 tons/day	83	760,817	2010	9.5*	1,199,004	2014
South County (US 192) SWMF	2,980	0	0	0	NA	730	135,000,000	NK
Mockingbird Way Mulching Facility	52	NA	NA	NA	NA	NA	NA	NA
Titusville Transfer Station	18	250 tons/day	NA	NA	NA	NA	NA	NA
Sarno Road Transfer Station	23	1,500 tons/day	NA	NA	NA	NA	NA	NA

*March 2008
**area permitted by FDEP, however, CUP denied by City of Melbourne
N/A – Not Applicable; NK – Not Known

Future trends in municipal recycling programs include: increased economic scrutiny, increased program efficiency and accountability, increased composting, construction and demolition materials recycling, increased regionalization and system analysis. Although the City of Melbourne's program has expanded four (4) times since its inception, recycling is subject to economic trends, market availability and cost versus effectiveness. Therefore, when the factors are substantial, the program will again be expanded. In the meantime, waste reduction will be promoted as a solution to conserving landfill space. One of the best solutions is to produce less trash from the start. Citizens will be educated to throw away less trash and decrease the amount of toxic and hazardous refuse in the waste stream.

D. DRAINAGE SUB-ELEMENT, DATA AND ANALYSIS

1. Existing Conditions.

The following distinctions were made regarding drainage and flood control systems. These systems were classified into two categories: minor and major, as described below.

Minor drainage systems provide relief from frequent storm water runoff events, and typically consist of curbs and gutters, street inlets, underground culverts, open channels, and on-site storage (i.e., retention) facilities and small detention facilities. These systems also consist of natural drainage features such as swales, gullies, ditches or canals. Minor systems are designed to accommodate flows that occur fairly frequently, such as the two, five and ten-year storm events.

Major drainage system are regulated floodways which serve major flood flow conditions, and are designed to accommodate flows that rarely occur, such as the 25 and 100-year storm events. Chapter 13 of the City Code (Flood Prevention and Protection) defines a regulated floodway as "the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot." The City Code further identifies the following as regulated floodways:

- Eau Gallie River.
- Crane Creek.
- Channel A, the drainage canal east of Airport Boulevard, which crosses Airport Boulevard at Eddie Allen Road, continues westward along Hibiscus Boulevard to Crane Creek Drainage Canal L-1, and then to Crane Creek.
- Channel B, the south branch of Crane Creek west of Babcock Street, which extends through the University Park Subdivision south of Dartmouth Avenue and north of Brown Avenue and University Estates, and continues westward to the Forest Creek Subdivision.

These other streams and structures are elements of the respective drainage areas within the planning area. These drainage features are shown on Map V-6, Drainage Basins and Ditches.

- Horse Creek.
- Elbow Creek.
- Eau Gallie River Basin
- Crane Creek Basin
- St. Johns River Basin
- Indian River Lagoon
- Banana River Basin
- North Ditch
- Two Unnamed Ditches
- Pineda (Suntree) Golf Course Basin
- Drained Farmland

Some of these floodways are identified on the Flood Insurance Rate Maps published for the National Flood Insurance Program by the Federal Emergency Management Agency. The latest edition of these maps was revised April 19, 1992.

The city's existing Stormwater Management Ordinance outlines predevelopment and post-development performance standards for design of stormwater runoff and drainage facilities, including retention/detention facilities for the 25-year/24-hour storm event, and as a minimum, retention facilities for the first inch of runoff from impervious surfaces and the runoff from the first inch of rain received from natural (i.e., pervious) surfaces. Also, as described above, Chapter 13 of the City Code identifies, and makes provisions for, regulated floodways to handle major flood flow conditions such as the 100-year storm event.

Since 1989, these regulations have been considered sufficient in maintaining the functions of both natural and man-made drainage features and facilities in the Melbourne Planning Area. In 1996, the counties abutting the Lagoon, including Brevard County, adopted the Indian River Lagoon Conservation and Management Plan (IRLCCMP). The CCMP places 75% of its total implementation costs within the stormwater management area.

Subsequently the County has had drainage studies performed for the Crane Creek and Upper Eau Gallie drainage areas, resulting in authorization from the Board of County Commissioners to pursue conceptual permitting with the St. Johns River Water Management District (SJRWMD). Concurrently the Melbourne-Tillman Drainage District has approved the initial phases of engineering to enable discharge of stormwater to be diverted from the Indian River Lagoon to the St. Johns River. The SJRWMD purchased 22 acres just east of the Melbourne Airport and adjacent to the FEC railroad. The property was then deeded to the City of Melbourne for a regional stormwater park with the condition that the city would construct stormwater facilities. The stormwater facilty/pond would provide treatment for potentially 1800 acres which currently discharge untreated into the Indian River Lagoon. The South Sarno Drainage Area improvement is a multi year project which when constructed will provide treatment for the Eau Gallie Drainage Basin identified in the Crane Creek and Hickory Ditch Basins Stormwater Master Plan. The diversion not only keeps the treated and untreated stormwater out of the Lagoon, but it also provides flow augmentation to the St. Johns River and the ability for silt absorption to occur naturally.

2. Future Conditions

The County has implemented a Stormwater Utility which does not have the ability to bond and to create major project funding. The Utility does generate operating funds which can be used for the provision of services to the drainage ways and for planning those activities which should be undertaken within the utility's jurisdictional area. The incorporated cities of West Melbourne, Melbourne, Melbourne Village and Palm Bay do not contribute to the County Stormwater Utility, and the utility is viewed as unable to make investments where it does not collect its fees.

The city will continue to take these actions to minimize the causes of muck accumulation including:

- Enforce the existing Stormwater Management Ordinance, ensuring that the maximum practicable prevention of erosion and sediment influx is realized.
- Require Erosion and Sedimentation Control (ESC) permits when conducting any land disturbing activity.
- Continue sediment control maintenance activities, which includes street sweeping throughout the Crane Creek Drainage area, routine catch basin cleaning and continuous drainage canal maintenance.

3. Planned Improvements.

As noted in the previous text, a series of improvements are planned. Additional analysis may be required to fully review the implications of the presently proposed plans for the Eau Gallie and Crane Creek drainage study areas, as shown in Map V-5, Drainage Area Studies, indicates the area of the two studies done by the County and Map V-6, Drainage Basins and Ditches, indicates the respective drainage basins and their related ditch structures.

E. POTABLE WATER SUB-ELEMENT, DATA AND ANALYSIS

1. Existing Conditions.

The City of Melbourne (City) is a regional water supplier for south Brevard County. The city holds a Consumptive Use Permit (CUP) issued by the St. Johns River Water Management District (SJRWMD). This permit allows the withdrawal of a combination of surface and ground waters of the state for public water supply. The Florida Department of Environmental Protection (FDEP) has issued all necessary current permits and regulates the city's water production and distribution facilities.

Per Florida Statutes, the City has completed a Water Supply Facilities Work Plan (Plan). The purpose of the plan is to strengthen the coordination between water supply planning and local land use planning. The Plan addresses the water supply facilities necessary to serve existing and future development within the City's water service area, in concurrence with the City's CUP. The Water Supply Facilities Work Plan is incorporated into the Comprehensive Plan as appendix A of the Infrastructure Element

The City has successfully reduced water consumption through its nationally recognized water conservation program, which is supported by full-time staff members. Initiatives that the City has successfully utilized in decreasing consumption include:

- A commitment to customer education and retrofit programs
- An aggressive capital improvement program to continually improve the water treatment system
- A strong water distribution system leak detection and repair program
- A nationally recognized industrial pretreatment program, supported by a full-time pre-treatment coordinator
- A commitment to individually metered water services
- A significant reclaimed water program
- A strong cross-connection control program
- A high recovery operation at the reverse osmosis water treatment facility
- A process water recycling procedure at the surface water treatment facility

a. Water production facilities. The City of Melbourne currently owns and operates two water treatment facilities (WTFs). The John A. Buckley Surface Water Treatment Plant (SWTP) treats water that is withdrawn from Lake Washington which is a part of the St. Johns River. The Joe Mullins Reverse Osmosis Water Treatment Plant (ROWTP) uses a reverse osmosis treatment system to treat ground water drawn from the Floridan Aquifer. The WTFs are described below in terms of:

- Geographic service area.
- Types of land uses served.
- Design capacity.
- Current demand and level of service.
- Plant performance.

- Impact on adjacent natural resources.

Geographic Service area - Melbourne's geographic water service area includes Melbourne, Melbourne Village, Melbourne Beach, Satellite Beach, Indialantic, Indian Harbour Beach, Palm Shores and some unincorporated areas of Brevard County. The city also sells water wholesale to the city of West Melbourne, which owns and operates its own distribution system. The city has an agreement with Patrick Air Force Base for water service on an as-needed basis, as well as a reciprocal agreement with the City of Cocoa for emergency water supply and an interconnect agreement with the City of Palm Bay. These agreements are on file in the city clerk's office. The Potable Water Service Area is shown in Map V-7.

Types of land uses served - The Melbourne water utility serves primarily residential and commercial land uses. Water service is also provided to a number of industrial and agricultural land uses.

Design capacity - Melbourne blends the product waters from its two WTFs. The total designed and permitted production capacity of the two WTFs is 26.5 MGD. This total designed capacity consists of 20.0 MGD and 6.5 MGD of design capacity from the SWTP and ROWTP, respectively. The 6.5 MGD ROWTP capacity includes 1.5 MGD of raw ground water that can be blended directly with the RO product water.

Current demand and level of service - Average daily demands in 2008 have been approximately 15.5 MGD. Maximum day demands have at times approached 18.0 MGD, while peak hour demands have been as high as 27.0 MGD. The water utility has sufficient water production and storage capacity to meet the current average day, maximum day and peak hour demands generated by customers in its water service area. Based on current demands in the potable water service area, and the number of customers associated with the water production and distribution system, the level of service provided by the City is approximately 100 gallons per capita per day.

In its Water Supply Facilities Work Plan, the City has examined the sources of water that can be utilized to serve both existing and future demand. The Plan also addresses the facility improvements that are required to meet future potable water needs.

Plant performance - Monthly regulatory reports document that the WTFs are currently meeting both federal and state safe drinking water standards.

Impact on adjacent natural resources - Operation of the WTFs has little or no impact on adjacent natural resources. De-watered residuals from the SWTP are disposed on a 30-acre residuals disposal facility adjacent to the ROWTP. The treated concentrate from the ROWTP is discharged to the Eau Gallie River.

b. Water distribution system. The overall water distribution system consists of approximately 1,100 miles of six (6) to 36-inch diameter transmission mains, and about 1,000 miles of two to 6-inch diameter distribution piping. The city is continuing to upgrade the distribution system in accordance with its Water Supply Facilities Work Plan, the most recently completed Water Distribution System Master Plan, and the City's Comprehensive Plan.

c. Water storage facilities. Water storage is provided at the SWTP in a 4.0 million gallon (MG) ground storage tank. The ROWTP has a baffled 4.0 MG ground storage tank that is used to blend and store the product waters from the two WTFs. The North Booster Pump Station has a 2.0 MG ground storage tank. Spread throughout the distribution system are two additional booster pump stations (total of 2.5 MG of storage capacity), and four elevated steel storage tanks (total of 2.0 MG of storage capacity). Total available storage capacity is 14.5 MG. Currently, the design of an additional booster pump station is underway. This booster pump station will be located in the northern end of the mainland portion of the service area, and will add 2.0 MG of storage capacity to the system.

d. Water supply wells. The city owns and maintains three 16-inch Floridan Aquifer production wells. The three wells supply raw water to the ROWTP. Currently, a project is under construction to add a fourth production well to the raw water supply system. This will provide additional flexibility and redundancy to the system. This new well was located at one of the previously installed 8-inch test/production well sites. In addition to the four production wells, there are two additional 8-inch test/production wells, and eleven monitoring wells of various sizes.

2. Future Conditions.

The Water Supply Facilities Work Plan developed by the City examines projected demand based upon adopted levels of service, adopted future land use map designations, and population projects. The contents of the Plan will be used by the City to identify the necessary facility improvements to meet these future demand conditions.

F. NATURAL GROUNDWATER AQUIFER RECHARGE SUB-ELEMENT DATA AND ANALYSIS

1. Present and Future Conditions.

Chapter 9J-5, FAC, generally defines recharge areas as ``land or water areas through which groundwater is recharged." Few such areas exist within the Melbourne Planning Area, as will be discussed below.

a. Floridan Aquifer. The top of the Floridan Aquifer in the Planning Area ranges from -150 feet NGVD (National Geodetic Vertical Datum) north of Melbourne to -350 feet NGVD south of Melbourne. The potentiometric surface of the aquifer is approximately +30 to +35 feet NGVD, which is generally above the existing average ground surface elevation. Therefore, little or no recharge can occur, because the upward pressure will not permit downward migration of water except under extremely high head conditions. Also, much of the Floridan Aquifer in the Planning Area is separated from the surficial aquifer by an ``aquitard," a confining layer of silt and clay mixed with sand, gravel, shell, and limestone beds. The impervious nature of this aquitard prevents water from migrating into the Floridan Aquifer. Due to the conditions described above, there is little or no recharge of the Floridan Aquifer in the Melbourne area.

b. Surficial Aquifer. The surficial aquifer in the Melbourne area is thickest along the Atlantic Coastal Ridge, and thins out east and west of the ridge. The top of the aquifer generally occurs between five and ten feet below the ground surface, and is recharged primarily by rainfall. The clay materials at the base of the aquifer are relatively impervious; therefore, groundwater flow is primarily lateral, as directed by pressure head differences in the aquifer.

Water quality of the surficial aquifer is variable throughout the area. Along the Atlantic Coastal Ridge, the water quality is often quite good (i.e., low in chlorides and total dissolved solids). However, the iron content of the water is high in some areas. In other areas, particularly south of Melbourne, the water quality is marginal, suitable only for individual supplies. Due to the low permeability of the surficial aquifer, the yield of shallow wells tapping into it is low.

c. Recharge areas. There are no prime aquifer recharge areas in the Melbourne area. (Prime recharge areas are those which recharge aquifers used for public drinking water supplies, or which have the proper combination of elevation and soils to potentially serve this purpose.) However, there are some lower classified recharge areas located along the Atlantic Coastal Ridge. These recharge areas do not supply large quantities of water, but serve to prevent lateral saltwater intrusion into inland groundwater reservoirs. Recharge areas are shown on Map V-8.

d. Existing groundwater recharge regulations/programs. The city’s specific regulations or programs for maintaining and preserving groundwater recharge areas are contained herein and include zoning regulations and various ordinances

(including ordinances for Planned Unit Development, subdivisions, landscaping, trees, and soil erosion/conservation) which accomplish essentially the same purpose. The purpose and intent of these land development regulations are briefly described below.

The existing policies of this section of the Comprehensive Plan limit land uses within surficial recharge areas as well as the extent of pervious coverage within a recharge area. These policies supersede the zoning regulations in impact and enforceability.

Existing zoning regulations define the type and intensity of development that may occur on a given site, and further determine the maximum lot coverage. Land use regulations for PUD sites include a minimum requirement for ``common recreation and open space" of 15 percent of gross site acreage. In addition, development of surficial recharge areas is limited to no more than two (2) units per acre; impervious surfaces should not exceed 65 percent of the recharge area; and alteration of topography is discouraged.

The city has a stormwater ordinance requiring on-site stormwater management planning that, in part, will enhance groundwater recharge. In recharge areas, developers must limit runoff from the proposed site to the greatest extent practical. Requirements for stormwater retention include facilities which have the capacity to retain the first inch of runoff from impervious surfaces, and the first inch of rainfall from pervious surfaces.

Minimum standards for landscaping include plant material selection, perimeter landscaping and interior requirements, and parking-to-landscaped area ratios and the use of native, draught tolerant species.

e. Assessment of regulations. The city's zoning regulations, Comprehensive Plan Policies, stormwater management, and landscaping ordinances accomplish a reasonable degree of protection of recharge areas. In fact, existing land use has generally developed in a manner favorable to natural groundwater recharge.

2. Planned Improvements.

There are no planned capital improvements directly supportive of this component of the Infrastructure Element; the policies required are within the existing city code and are used in all development permitting reviews.