

## SECTION 4: EXISTING DRAINAGE SYSTEM

### 4.1 BACKGROUND

Wheeler's storm drainage system is largely undocumented and the product of adhoc efforts to solve localized problems. Relatively few areas are served by a system of stormwater intakes and pipelines; most areas are served by ditches and isolated culverts. "Ditch" is a very broad term in this context, since many of the ditches have largely filled in or are simply low areas that have eroded sufficiently to act as channels. Many culverts are filled with sediment which severely limits their utility. Some culverts have filled in to the point where it is almost impossible to locate them without prior knowledge of their existence and approximate location.

Many of the City streets lack sufficient surface curvature (crown) to direct water effectively to a suitable ditch or intake. Rainfall sheets directly down roadways in many places. In some gravel roadways, the sheeting has eroded channels on the surface itself.

Extensive fieldwork was conducted in winter and spring 2005 to locate and document the existing culverts and other storm water related problems and infrastructure. City provided plans (for various improvement projects) were also checked and field verified for storm water related features. Problem areas were more noted and, as part of the visual survey, potential pollutant sources were also noted. Most fieldwork was conducted during the extensive dry weather periods that characterized early 2005. Surface water flow patterns were noted on several wet weather visits. This latter information was used to refine basin delineation and to help define problem areas and project needs.

### 4.2 EXISTING DRAINAGE SYSTEM MAPPING

#### 4.2.1 Basemap

The basemap was prepared using Tillamook County GIS as a primary source. USGS 40 foot elevation contours were added. Street right-of-ways were highlighted, where applicable, to indicate a useable city roadway. Street names, creek names, and other details were added. The basemap was created using AutoCAD software.

#### 4.2.2 Basin Delineation

Drainage basins were delineated using USGS topographic information and from

observation of actual rainfall runoff during field visits. Existing storm water infrastructure and existing development also influenced basin delineation. Basin descriptions are included in Section 4.3

Basins are shown on Figure 4.1 for the entire drainage area. Figure 4.2 shows basins within the City in greater detail.

#### 4.2.3 Existing Drainage System Maps

Figures 4.3, 4.4, and 4.5 show the existing drainage system and basin boundaries. Drainage arrows have been added in places to indicate general runoff flow directions. Existing culverts and pipes are labeled by basin, with a "P" prefix followed by a number. An "N" prefix followed by a number refers to a "node" and includes: catch basins, manholes, intakes, and other storm water structures.

### 4.3 DRAINAGE BASINS AND EXISTING INFRASTRUCTURE

#### 4.3.1 General

The following subsections include a general description of the drainage basins and infrastructure. Infrastructure is referenced to the existing system maps by pipe or "node" number.

#### 4.3.2 Basin C1. (See Figure 4.3)

**Description.** Basin C1 (410 acres) is undeveloped with the exception of Dichter Drive. Most of Dichter drive is a very rough dirt track overgrown with grass, weeds, and a mix of one or two year old trees and shrubs. Vegetation in Basin C1 is primarily forest. The basin defines the drainage area of an unnamed creek above Highway 101.

#### **Storm Water Infrastructure.**

- P1 30", 100 LF, concrete. Upstream end: 1/2 filled in.  
Downstream end: clear, but last 3' section was undermined and fell off.
  
- P2 36", 115 LF, corrugated metal. Upstream end: clear, protected by stone and mortar, good condition.  
Downstream end: clear, good condition. There is a second, older pipe on the downstream end that has some flow

(assumed groundwater). Downstream end is elevated above creek and constitutes a barrier to fish passage.

P3 10", 62 LF, corrugated plastic. Both ends clear. Drains undeveloped area to the south. Relatively new construction.

P4 12", 80-100 LF, corrugated metal. Upstream end: clear, fair condition. Downstream end: located in blackberry brambles, 1/2 filled in. Pipe appears to bend somewhere between the ends.

#### 4.3.3 Basin C2 (See Figure 4.3)

**Description.** Basin C2 (2.4 acres) is largely developed. The area drains to a culvert that crosses Highway 101 and discharges via a ditch to an unnamed creek.

##### Storm Water Infrastructure

N1 Small, flat grate. Good conditions. Receives flow via two ditches.

P1 12", 54 LF, concrete. Good condition.

#### 4.3.4 Basin C3 (See Figure 4.3)

**Description.** Basin C3 (9.0 acres) is fully developed, though most of the land is comprised of a large wetland/marsh. The unnamed creek joins Vosburg Creek here. Old maps show the unnamed creek discharging separately from Vosburg Creek. Presumably, the area was filled and the stream course altered. The area is subject to tidal influence.

##### Storm Water Infrastructure

P1 36", 40 LF, corrugated metal. Relatively new construction, some corrosion, 1/4 filled in.

P2 42", 31 LF, concrete. Good condition.

#### 4.3.5 Basin V1 (See Figure 4.3)

**Description.** Basin V1 (1,937 acres) is undeveloped with the exception of the east side of Pennsylvania Avenue and a few homes on the west side of DuBois Street and Winckuer Street. There is one dwelling located in the middle of the wetland along Vosburg Creek. The basin defines the major drainage area of Vosburg Creek. The area is forested and extends up to an elevation of approximately 1300 feet. Vosburg Creek flattens out on the lower stretches west of DuBois Street and is surrounded by extensive wetlands.

##### **Storm Water Infrastructure.**

P1 5'x5' concrete box culvert. Good condition.

#### 4.3.6 Basin V2 (See Figure 4.3)

**Description.** Basin V2 (5.9 acres) is fully developed with homes, streets, and yards. Constructed infrastructure is such as to direct flow to Basin V1. A concrete plug was discovered in the upstream inlet of the junction box (N8); consequently, it is thought that at least some of the flow surcharges and overflows from the grate (N6) and flows down to Basin C2. Pennsylvania Avenue is one of the few streets in Wheeler that has an extensive, constructed storm water infrastructure.

##### **Storm water Infrastructure**

N1 1'x1'x1' plastic catch basin with grate. 6" pipe exits east - assume connects to north-south pipe.

N2 3'x2' iron grate. Grate highly corroded. Inlet includes an 8" clay pipe and a 10" concrete pipe. Outlet is 8' corrugated plastic.

N3 2'x2' rusted grate. Shallow concrete catch basin in very poor condition.

N4 2'x3' grate.

N5 Round grate. Placed on top of hole that was cracked out of

- the top of the 6' concrete line (P12).
- N6 Grate on 1'x1'x1' plastic catch basin. Catch basin is broken. All pipes clear.
- N7 2'x2' grate. Catch basin and grate in good condition.
- N8 Concrete catch basin with wood lid. Inlet from the south appears to be blocked with concrete plug.
- N9 2'x2' iron grate. 2'x2'x3' concrete catch basin. Catch basin in poor condition. Grate highly rusted.
- P1 10", 180 LF, corrugated plastic. 1/2 - 3/4 filled in.
- P2 10", 20 LF, corrugated metal. Line is clear and in fair condition.
- P3 8", 20 LF, corrugated plastic.
- P4 10", 200 LF, corrugated metal. Clear. In fair condition.
- P5 12", 20 LF, corrugated plastic. Inlet and outlet 1/4 filled in. Driveway culvert.
- P6 Assumed 10" concrete pipe that enters N2. 166 LF.
- P7 6", 40 LF, corrugated plastic. Driveway culvert. Both ends covered with gravel.
- P8 8", 63 LF, concrete. Clear.
- P9 8", 10 LF, concrete. Fair condition.
- P10 Driveway Culvert.
- P11 6" or 8", 178 LF, concrete
- P12 6", 85 LF, concrete. Hole in top. (See N5).

- P13 6", 16 LF, concrete.
- P14 6", 26 LF, corrugated plastic. Good condition.
- P15 6", concrete.
- P16 8", corrugated plastic.
- P17 8", 77 LF, corrugated plastic. Good condition. Clear.

#### 4.3.7 Basin V3 (See Figure 4.3)

**Description.** Basin V3 (22.9 acres) is generally undeveloped with exception of a few homes along Vosburg Street, Gamble Street, and 4<sup>th</sup> Street. Forest covers approximately 80 percent of the area. Drainage is generally west toward Vosburg Creek

#### **Storm Water Infrastructure.**

- N1 Grate over vertical 24" corrugated plastic pipe.
- P1 12", 20 LF, corrugated plastic. Driveway culvert. Both ends 1/2 filled in.
- P2 8", 39.5 LF, corrugated plastic. Upstream partially obstructed. Downstream clear.
- P3 12", 19.5 LF, corrugated plastic. Upstream 3/4 filled in. Downstream 1/4 filled in.
- P4 12" 39.5 LF, corrugated plastic. Upstream 1/4 filled in. Good condition.
- P5 12" corrugated plastic. No outlet found.
- P6 18", 60 LF, corrugated plastic. Upstream 1/4 filled in. Downstream clear. Good condition.
- P7 12"-24", 57 LF, corrugated plastic. Upstream over 3/4 filled in. Downstream almost fully covered. Exact size and

condition not known.

- P8 18", 69 LF, corrugated plastic. Upstream and downstream almost clear. Fair/good condition.
- P9 24"-36", 80 LF, corrugated metal. Upstream over 3/4 filled in. Downstream 1/4 filled in. Fair condition.
- P10 12", 20 LF, corrugated metal. Poor condition. Lost of rust. 3/4 filled in.
- P11 12", 20 LF, corrugated plastic. Upstream 1/4 filled in. Downstream almost fully covered.

#### 4.3.8 Basin V4 (See Figure 4.3)

**Description.** Basin V4 (4.0 acres) is largely developed with several homes and yards. There is approximately 20 percent forest cover. The area drains northwest to Vosburg Creek.

##### **Storm Water Infrastructure.**

- N1 Grate and pipe. Not found on return visits
- N2 18"x22" steel grate. Good condition.
- N3 18"x22" steel grate. Good condition.
- N4 1.5'X2.5' steel grate.
- P1 12", 64, LF, corrugated plastic. Good condition.
- P2 12", 139 LF, plastic.
- P4 12", 54 LF, corrugated metal.
- P5 12", 75 LF, corrugated plastic. Outlet filled in with rocks and grass.

P6 6", 350 LF (estimate). The line is reported to include some perforated pipe to direct flow from a spring.

#### 4.3.9 Basin V5 (See Figure 4.3)

**Description.** Basin V5 (7.5 acres) is largely developed with approximately 15 percent in forest cover. Approximately 50 percent of the area covered with impermeable surfaces associated with clinic buildings and paved parking. Basin V5 drains primarily toward the northwest corner of Basin V3.

##### **Storm Water Infrastructure.**

N1 1'x1' grate and plastic catch basin. Fair condition. Assume connects to line running down Rowe Street.

N2 1.5'x2.5' grate. 12" inlet and outlet along Rowe Street. 10" inlet from the southwest.

N3 Cast iron grate in good condition.

P1 6", 71 LF, corrugated plastic.

P2 12", 115.5 LF, corrugated plastic.

P3 12", 54 LF, corrugated plastic. Downstream end is 12" corrugated metal and is 3/4 filled in with gravel.

P4 12", 101 LF, corrugated plastic. Upstream clear. Downstream 1/8 filled in. Good condition.

P5 12", 50 LF (estimate), corrugated plastic inlet but concrete outlet.

#### 4.3.10 Basin V6 (See Figure 4.3)

**Description.** Basin V6 (9.1 acres) is undeveloped and forest covered - with the exception of Vosburg Street and 4<sup>th</sup> Street. There is an area (near P1) on 4<sup>th</sup> Street that is subject to puddling and washouts.



**Storm Water Infrastructure.**

P1 12", 40 LF (estimate), corrugated metal. Upstream filled in and not found. Downstream clear. Fair/poor condition.

**4.3.11 Basin N1 (See Figure 4.3)**

**Description.** Basin N1 (5.3 acres) is largely undeveloped except for the roadways and development along Highway 101. Hospital Road and Rowe Street surrounded a depression with extensive wetlands at the bottom and tree and shrub cover. Drainage is directed via a culvert across Highway 101. There is some uncertainty as to whether the depressed area drains directly (perpendicular) across Hospital Road or angles across to Basin N2. No outlet was found for P1.

**Storm Water Infrastructure.**

N1 24'x17' iron grate.

N2 24"x17" iron grate.

P1 18", concrete. Inlet 1/4 filled in. Good condition. Outlet not found in Basin N1. 18" pipe (P4) found in Basin N2 was thought to be outlet; however, minimal flow was observed during a very wet period.

P2 6", 72 LF.

P3 35 LF.

**4.3.12 Basin N2 (See Figure 4.3)**

**Description.** Basin N2 (4.8 acres) is largely developed south of Hospital Road, there is approximately 1/2 acre forest cover on one lot. North of Hospital Road, the entire area extending down to Highway 101 is dirt covered from recent clearing activities. Basin N2 drains via culvert across Highway 101.

### Storm Water Infrastructure.

- N1 27"x32" cast iron grate. Good condition.
- N2 17"x24" cast iron grate. Good condition.
- N3 16"x25" cast iron grate. Good condition.
- N4 16"x25" cast iron grate. Good condition.
- P1 10", 40 LF, corrugated plastic. Driveway culvert. Excellent condition.
- P2 8", 106 LF, corrugated plastic. Upstream 1/4 filled in. Good condition.
- P3 10"-12", 35 LF, corrugated metal. Upstream completely covered. Downstream 1/4 filled in. Good condition.
- P4 18" concrete. (See discussion for P1 in Basin N1). Pipe was dry during recent wet period. Pipe may be "debris" associated with clearing activities in the area. Not clear whether it has any purpose.
- P5 10", 102.5 LF, corrugated plastic. Good condition.
- P6 12", 60 LF, corrugated metal. Good condition.
- P7 6", 49 LF, plastic. Good condition.
- P8 12", 47 LF, concrete. Outlet 1/4 filled in.

#### 4.3.13 Basin N3 (See Figure 4.4)

**Description.** Basin N3 (11.1 acres) is moderately developed according to current zoning. The area between Hospital Road and Highway 101 has been cleared recently. The City Park is included in this area as well as other public lands, City Hall, and Public Works. Approximately 40 percent of the area is forest covered. The west side of Hall Street has storm water infrastructure along its entire length. Basin N3 discharges via culvert across Highway 101.

**Storm Water Infrastructure.**

- N1 28"x28" steel grate and catch basin with oil trap.  
Surcharged, pipe not visible.
- N2 28" X 28" steel grate and catch basin with oil trap.  
Surcharged, pipe not visible.
- N3 2'x2' grate. Surcharged, pipe not visible.
- N4 Manhole with dimpled iron lid. Filled to rim with dirt.  
Probably not part of storm water system.
- N5 1.5'x2' iron grate. Surcharged, pipe not visible.
- N6 2'x2' iron grate. Good condition.
- N8 1'x1.5' iron grate.
- P1 6", 60 LF, corrugated metal. Downstream discharges above  
N1. Upstream 90 percent filled in. Pipe corroded and bent.
- P2 213 LF.
- P3 115.5 LF.
- P4 38 LF.
- P5 92 LF.
- P6 8", 97.5 LF.
- P7 6"
- P8 6", 32.5 LF.
- P9 6"
- P10 18", 53 LF, concrete.

#### 4.3.14 Basin N4 (See Figure 4.4)

**Description.** Basin N4 (3.8 acres) includes the marina and associated commercial development. The area is fully built out, and there is very little vegetation except in the Right-of-Ways associated with Highway 101 and the railway. The developed area is flat and there are many small grates that have been privately constructed and connected to the City's storm water system to alleviate localized ponding of surface water. Basin N4 discharges directly to the Nehalem River via a bank discharge. Four small drain lines are visible above the retaining wall, on the west side of the building, which drain directly to the river.

#### Storm Water Infrastructure.

- N1 16"x16" grate and shallow concrete catch basin. Good condition.
- N2 Grate.
- N3 Grate.
- P1 8", 280 LF (estimate). Possibly two pipes: 1 solid, 1 perforated.
- P2 12", 190 LF (estimate), corrugated plastic. Discharge on bank of Nehalem River.
- P3 10", 190 LF (estimate), plastic. Second line installed along P2 and (reported) connected perforated pipe (P1 and/or P4) that was laid under the ditch.
- P4 8", 250 LF (estimate) corrugated plastic. Pipe size and details not known. Possibly two pipes: 1 solid, 1 perforated.
- P5 12", 80 LF, plastic. Pipe installed to help redirect drainage from N5.

#### 4.3.15 Basin N5 (See Figure 4.4)

**Description.** Basin N5 (1.9 acres) includes parts of the Highway 101 and railway Right-of-Ways (ROW) and the dirt/gravel roadway on the west side of the railway ROW. The area has no developed storm water infrastructure or buildings. Basin N5 drains to Basin N4 near the terminus of P5 (in Basin N4). Flow is not well directed and tends to flow and pond within the developed parts of Basin N4.

#### 4.3.16 Basin N6 (See Figure 4.5)

**Description.** Basin N6 includes all areas on the river side of Highway 101 that have not otherwise been identified as significant by being designated as part of a specific basin. Storm water in this area runs off directly to the river or tends to pond (most of the area is almost flat and within the 100 year flood plain). Development is limited to some of the higher ground near the City's downtown. With the exception of a culvert (P3) located approximately 250 feet south of Zimmerman Creek, constructed storm water infrastructure is limited to the underground piping associated with the re-directed Gervais Creek and its outfall.

##### Storm Water Infrastructure.

- N1 Manhole. 10.2' deep.
- P1 36", 115 LF.
- P2 36", 200 LF, concrete. Outfall pipe is only above water during minus tides. The outfall was viewed on June 5, 2005 at 8 a.m. during a -1.0 foot tide. The outfall appeared to be 1/2 filled with rocks and sediment.
- P3 Culvert.

#### 4.3.17 Basin G1 (See Figure 4.4)

**Description.** Basin G1 (749 acres) is generally undeveloped and forest covered with the exception of limited residential development along 3<sup>rd</sup> street, Fir Street and Alder Street. Basin G1 defines the drainage area of Gervais Creek upstream of the intake to the pipeline that conveys Gervais

Creek to the Nehalem River. Elevations extend up to approximately 1000 feet.

### **Storm Water Infrastructure.**

- N1 1'x1' iron grate and catch basin, clear.
- N2 Heavy iron trash rack and concrete wing walls. Intake to pipeline conveying Gervais Creek to the Nehalem River. Good condition.
- N3 1'x2' grate. New construction.
- P1 6", 40 LF, corrugated metal. Clear.
- P2 48", 40 LF, corrugated metal. Culvert for Gervais Creek. City waterline crosses in fill over culvert. Approximately 1/8 filled in. Extremely poor condition. Creek has eroded around the culvert and flows under and around culvert in addition to through it.
- P3 12", 110 LF, plastic. New condition. Clear.
- P4 12", 41 LF, corrugated plastic.
- P5 12", 110 LF, plastic. New. Downstream 1/4 filled in. Driveway culvert.
- P6 12", 34 LF, corrugated plastic. New. Driveway culvert.

#### **4.3.18 Basin G2 (See Figure 4.4)**

**Description.** Basin G2 (30.2 acres) is moderately well developed and includes the downtown business district. The area does include isolated, vacant tree covered lots and tracts. Also included is a forest covered area that extends up the hillside to approximately 500 feet in elevation. An underground pipe system conveying Gervais Creek to the Nehalem River is a notable feature. The pipe system passes under several buildings and has resulted, under some unusual conditions, in flooded basements.

**Storm Water Infrastructure.**

- N1 8"x1.5' grate on concrete catch basin. New.
- N2 1.5'x1.5' grate. Fair condition.
- N3 1'x1' grate and plastic catch basin.
- N4 8"x2' grate. Clear.
- N6 1'x1.5' grate and concrete catch basin. Fair condition.
- N7 1.5'x1.5' grate.
- N8 1'x1.5' grate on concrete box. Good condition.
- N9 1'x1.5' grate on concrete box.
- N10 Grate.
- N11 1.5' diameter grate. 10.3' deep concrete manhole.
- N12 2'x2.5' grate.
- N13 1.5' diameter grate.
- N14 Grate.
- N15 Manhole.
- N16 Grate.
- N17 Manhole with dimpled lid. 15.8' deep.
- N18 1'x1.5 grate.
- N19 1'x1' grate.
- N20 2'x2.5 grate.

- N21 1'x2.5' grate.
- N22 2'x2.5' grate.
- N23 2'x2.5' grate.
- N24 1'x2' grate.
- N25 Manhole with dimpled lid. 5.7' deep.
- N26 2'x2.5' grate.
- N27 Grate.
- N28 1'x2.5' grate.
- N29 1.5'x2.5' grate.
- N30 1.5'x2.5' grate.
- N31 Grate.
- N32 1'x1' grate.
- P1 12", 75 LF, corrugated plastic. New. Driveway culvert.
- P2 12", 31 LF, corrugated plastic. New. Clear.
- P3 8", 92LF, corrugated plastic. Upstream clear. Downstream completely filled in. Driveway culvert.
- P4 12", 20 LF, corrugated plastic. Driveway culvert. Ends filled in; runoff eroding channel across driveway.
- P5 6", 31 LF, corrugated plastic. Upstream end 1/2 filled in. Downstream clear. Driveway culvert.
- P6 12", 51 LF, corrugated metal. Fair condition. Upstream end clear. Downstream 1/2 filled in. Driveway culvert.



- P7 4", 5 LF, concrete.
- P8 6", 40 LF, corrugated metal. Clear. Good condition.
- P9 12" abandoned concrete line. Parallel to P8.
- P10 50 LF. Upstream end is 12" corrugated metal. Downstream end consists of rusted rings that surround a wood pipe (wood not visible). Extremely poor condition.
- P11 12", 20 LF, corrugated plastic. New. Driveway culvert.
- P12 6", 92.5 LF, appears to be "stove" pipe.
- P13 Old wood pipe. Not clear if it extends under adjacent driveway.
- P14 10 LF. Wood pipe. Completely filled in.
- P15 12", 37 LF, corrugated metal.
- P16 12", 10 LF, corrugated metal.
- P17 12", corrugated plastic. Assume extends 203 LF to upstream box.
- P18 6", 100 LF, corrugated plastic. Appears to extend to north end of driveway where it appears as 12" corrugated plastic (approximately 1/4 filled in).
- P19 6" corrugated metal. Very poor condition.
- P20 6" concrete. Upstream clear. Good condition. Downstream: could not locate end.
- P21 Inlet pipe to N10. Clear.
- P22 36" (reported). Connects to inlet (N2 in Basin G1).
- P23 36" (reported).
- P24 36" (reported). Passes under buildings.

- P25 36" (reported). Passes under buildings.
- P26 Storm sewer line.
- P27 Storm sewer line.
- P28 Storm sewer line.
- P29 6" line. Transitions to 4" line toward end.
- P30 4" line.
- P31 Culvert end. Remainder not found.
- P32 8", 30 LF, corrugated plastic. New. Driveway culvert.
- P33 4", 43.5 LF, corrugated plastic. Clear.
- P34 Storm line shown on old sewer map. Passes under buildings.

#### 4.3.19 Basin Z1 (See Figure 4.1)

**Description.** Basin Z1 (169 acres) is undeveloped and entirely forest covered. Basin Z1 is the upper drainage area of Zimmerman Creek. The area extends up the hillside to an elevation of approximately 900 feet. Only a few lots in this area are zoned for development.

#### 4.3.20 Basin Z2 (See Figure 4.5)

**Description.** Basin Z2 (97.9 acres) is almost fully development in the area bounded by Hemlock Street, 5<sup>th</sup> Street, Cedar Street, and 3<sup>rd</sup> Street. There are a few additional homes south of Cedar Street and inside the UGB. Drainage in the lower areas is generally towards the north through several culverts to Zimmerman Creek. Hemlock Street forms the boundary between Basin Z2 and Z4. Hemlock Street is severely damaged and subsiding toward Zimmerman Creek. The basin extends up the hillside to an elevation of approximately 500 feet. Approximately 80 percent of the area is forest covered.

**Storm Water Infrastructure.**

- N1 Steel trash rack on 3'x9' concrete intake structure. Relatively new. Grate is raised approximately 8" to avoid blockage.
- N2 1.5' diameter grate on 6' deep concrete "manhole".
- N3 Deep corrugated metal "manhole". 2 influent lines from west (8" plastic 7' down from top; 12" corrugated plastic 1' down). 2 influent lines from east (both 12" corrugated plastic; one is 1.5' down, other is 8' down). 12" outlet to north is clear. Primitive wood cover.
- N4 Manhole.
- N5 Manhole.
- N6 2'x2' iron grate.
- N7 2'x1' grate and concrete catch basin. Concrete forms left inside. Clear.
- P1 24", approx. 160 LF, corrugated metal. Serves as conduit for relocated Zimmerman Creek.
- P2 24", 51+LF. Outlet not accessible on steep hillside.
- P3 12", 20 LF, corrugated plastic. New. Clear. Driveway culvert.
- P4 12", 20 LF, corrugated plastic. New. Clear. Driveway culvert.
- P5 12", 30 LF, corrugated metal (upstream) and corrugated plastic (downstream). Clear. Driveway culvert.
- P6 12", 20 LF, corrugated metal. Upstream clear. Downstream 3/4 filled in. Good condition.

- P7 12", 21 LF, corrugated plastic. New. Clear. Driveway culvert.
- P8 12" plastic. Inlet only found.
- P9 Short line to ditch on other side of driveway.
- P10 12", 24 LF, 12" corrugated metal. Upstream 1/2 filled in. Downstream 3/4 filled in. Good condition. Driveway culvert.
- P11 26 LF. Clear. New. Driveway culvert.
- P12 12", 30 LF, corrugated plastic. New. Clear. Driveway culvert.
- P13 12" plastic. Downstream end in dense blackberries (end not found).
- P14 12", 46 LF. Downstream 2/3 filled in.
- P15 12", 20 LF, corrugated plastic. Clear. Driveway culvert.
- P16 12", 26 LF, corrugated plastic. Upstream 1/3 filled in. Downstream clear. Driveway culvert.
- P17 12", 20 LF, corrugated plastic. Clear. Driveway culvert.
- P18 12", 19 LF, corrugated plastic.
- P19 12", 45 LF, corrugated plastic.
- P20 8", plastic.
- P21 12", 52 LF, corrugated metal.
- P22 75 LF.
- P23 Pipe indicated on old drawings. No details available.

- P24 24" corrugated metal. Outlet approximately 8' below roadway. Outlet partially crushed but still functional.
- P25 12", 32 LF, corrugated plastic.
- P26 12", 20 LD, corrugated plastic. 1' separation between P25 and P26. P24 passes under and is not connected to P25 or P26.
- P27 6", 17LF, corrugated metal. Upstream end filled in.
- P28 6" plastic. Downstream end is buried. Possible location found but not verified.
- P29 12", 60 LF, corrugated metal. Clear. Good condition.
- P30 10", 141 LF, corrugated metal (upstream end) and corrugated plastic (downstream end).
- P31 6", 30 LF, wood. Highly degraded wood pipe. Clear. Driveway culvert.
- P32 12" plastic. Good condition. Upstream 1/3 filled in. Downstream end not accessible.

#### 4.3.21 Basin Z3 (See Figure 4.5)

**Description.** Basin Z3 (14.2 acres) is moderately developed. Drainage is generally to the northwest. Stormwater drains by culvert and pipe across Hemlock Street and discharges to the marsh associated with Zimmerman Creek in Basin Z6.

#### Storm Water Infrastructure.

- N1 16"x18" grate on concrete catch basin. Good condition.
- N2 24"x24" grate on concrete catch basin.
- N3 1'x1' grate on plastic catch basin. Fair.

- N4 16"x32" grate on concrete catch basin. Good.
- N5 14"x24" grate. Good.
- N6 14"x24" grate. Good.
- N7 28"x28" grate. Good.
- P1 12" plastic. Downstream end not found.
- P2 12" corrugated plastic. 1/2 filled in. Downstream end not found.
- P3 8", 197 LF, corrugated plastic.
- P4 Line shown on Water System plans.
- P5 8", 213 LF, plastic.
- P6 48.5 LF.
- P7 12", 240.5 LF, corrugated metal.
- P8 4" plastic.
- P9 12" concrete. Good condition. Clear.
- P10 10", 40 LF, corrugated plastic.
- P11 12" 46 LF, corrugated plastic. Clean. Good condition.
- P12 15", 62+ LF, concrete. Clean. Downstream end not found.

#### 4.3.22 Basin Z4 (See Figure 4.5)

**Description.** Basin Z4 (269 acres) is undeveloped with the exception of a few homes. Drainage is westward to Zimmerman Creek. There are only a few acres of land within the City limits of this basin that are suitable for development. Development is further limited by steep slopes and the riparian area around Zimmerman Creek. Basin Z4 discharges to Basin Z6

via two 48" diameter culverts. Currently, there is a beaver dam forming a semi-circle around the culverts and creating a small pond behind it.

**Storm Water Infrastructure.**

- P1 48", 60 LF, corrugated metal. Two side by side pipes for Zimmerman Creek. A beaver dam was observed that was constructed as a semi-circle around the inlet. There is a small pond upstream of the beaver dam.
- P2 18" concrete. South end 1/2 filled in. North end not visible.

**4.3.23 Basin Z5 (See Figure 4.5)**

**Description.** Basin Z5 (18.3 acres) is largely undeveloped with the exception of new development on Ridgeview Court and Ridgeview Place. Drainage is to the southwest and west to Basin Z6.

**Storm Water Infrastructure.**

- N1 27"x32" grate and concrete catch basin. New.
- N2 27"x32" grate and concrete catch basin. New.
- N3 27"x32" grate and concrete catch basin. New.
- P1 18", 64 LF, concrete.
- P2 12", 26 LF corrugated plastic
- P3 12", 20 LF corrugated plastic, downstream plugged.
- P4 18", 22 LF, concrete.
- P5 18", 39 LF, concrete.
- P6 24", 70 LF, concrete.

#### 4.3.24 Basin Z6 (See Figure 4.5)

**Description.** Basin Z6 (8.5 acres) is undeveloped and consists primarily of tidal marsh and riparian areas associated with Zimmerman Creek. There are a few lots near Hemlock Street that have some potential for development. The area drains to Zimmerman Creek. Zimmerman Creek drains to Basin N6 via a 48"x48" box culvert under Highway 101 and the railway.

##### **Storm Water Infrastructure.**

P1 48"x48" concrete box culvert with wing walls. Good condition.

#### 4.3.25 Basin Z7 (See Figure 4.1)

**Description.** Basin Z7 (139 acres) is undeveloped and forest covered with the exception of one house. Further development will likely be limited to only a few homes. The area drains to Basin Z6.

##### **Storm Water Infrastructure.**

P1 24", 42 LF, corrugated metal. Good condition.

P2 Culvert.

P3 18" CMP, 75 LF. Fair.

#### 4.3.26 Basin W1 (See Figure 4.1)

**Description.** Basin W1 (395 acres) is largely undeveloped and forest covered with the notable exception of the Paradise Cove Resort and Marina. Most of the existing development is north of Highway 101 and drains directly to Nehalem Bay. Most of the area south of Highway 101 drains via a deep, natural drainway that crosses, by culvert, under the fill that supports Highway 101.



#### 4.4 WATER QUALITY

In 2003, DEQ completed its total maximum daily load (TMDL) study for the North Coast Subbasins. The study includes the Nehalem River and its tributaries. Its purpose was to establish water quality goals within the North Coast Subbasins. A TMDL is the total quantity of a specified pollutant that enters the water body without violating water quality standards. The Federal Clean Water Act (CWA) requires the establishment of TMDLs for water quality limited bodies of water under Section 303 (d) of the CWA. Nehalem Bay, adjacent to Wheeler, was listed in 1998 as water quality limited for fecal coliform. The TMDL study found, based on modeling, that water quality standards, for fecal coliform near Wheeler, were generally met during the later summer, and that the greatest violations of water quality standards were likely to occur in the late fall and early winter. Dry weather data for fecal concentrations were well below the pollutant criteria (14 MPN/100 ml).

Because of the background studies and DEQ concern, notes were made of potential sources of pollutants in general, and coliform specifically, during all field work conducted for this study. Possible pollutant sources include:

##### Coliform

- A dwelling (the only one) off the west side of DuBois Street, near 2<sup>nd</sup> Street, and located in the wetland of Vosburg Creek, is reported to not be on City water or sewer. Given the location, it is a potential source of fecal contamination in Vosburg Creek.
- Pet waste. The City is fully sewerred, and has no agriculture or agricultural areas tributary to it. Coliform levels appear to be a seasonal concern associated with surface water runoff after the summer dry period. Pet waste is the most probable source. Free roaming dogs were encountered on most of the field visits - most notably, several very large dogs in the commercial area near the bay (Basin N4). Just southwest of the Gervais Creek outlet (Basin N6) is a parking area adjacent to a grassy area that has been used to "walk" dogs. Most probably these are pets of tourists and others who turn off Highway 101. Several dogs were also observed in the area behind the Wheeler Marketplace (Basin G2). This area has a relatively steep slope that drains to an intake above the line that routes Gervais Creek to the bay.
- Wild animal sources. Fecal coliform is associated with all warm blooded

animals (mammals and birds). Beavers were observed on several field visits: in Vosburg Creek off the south side, and adjacent to, Highway 101; and in Zimmerman Creek at the transition of Basin Z4 and Basin Z6. Most of the drainage area is forested and presumably hosts resident or transient herds of deer and elk. Wetland, marsh, and other low elevation areas along the bay are attractive to waterfowl. Migratory patterns may also contribute to seasonal peaking of coliform levels.

#### Other Pollutants

- The water related commercial area near the bay (Basin N4) has a very large assemblage of boats and motors in various stages of repair (at certain times of the year). Maintenance activities and/or leaking motors could deposit paint, solvents, lubricants, or fuel on the ground which eventually gets transported by runoff into the bay.
- The basement of the Wheeler Station (above Gervais Creek in Basin G2) has experienced numerous floods in recent years. It is used by the occupant for furniture refinishing and storage. According to the occupant, he can predict when a basement flood is likely to occur by noting the height of the tide and the recent weather. He then moves materials in the basement to avoid damage. Given the nature of chemicals used in furniture refinishing (solvents and finishes) there is a possibility for some pollutants to be washed out to the bay as flood waters recede.

No other specific (potential) sources of coliform or other pollutants were noted. There are many other possible storm water related pollutants that could be associated with a community like Wheeler. These include:

- Pesticides, herbicides, and fertilizers associated with residential or grounds/park or forest maintenance.
- Fungicides or other roofing treatments.
- Improperly disposed of, or leaking, fuel, solvents, paint, or oil.
- Sanitary sewer exfiltration or overflows.