EXHIBIT 14

Parklands Executive Residential Subdivision and the Parklands Business Park

PRELIMINARY STORMWATER DESIGN REPORT (TIR)

FOR
CITY OF CAMAS

11-24-2015

CERTIFICATION OF FEASIBILITY-

The stormwater plan designed for the Parklands Executive Residential Subdivision and Parklands Business Park is FEASIBLE and has been designed in accordance with Camas Municipal Code (CMC) 14.02 and Camas Stormwater Design Standards Manual (CSDSM) and has the ability to meet or exceed the applicable code requirements.

PREPARED BY
Kessi Consulting – James Kessi P.E.
6400 NE Hwy 99# G169
Vancouver, WA 98665
james.kessi@gmail.com
360-991-9300

November 24, 2015

TABLE OF CONTENTS

APPENDICES

Appendix A files

A-1 GIS Development Packet
A-2 FIRM Map
A-3 Basin Maps

1) **Fig. 1A Historic Basin Map**
2) **Fig 1B Historic Basin Map – add projects**
3) **Fig 2A Project Areas**
4) **Fig 2B Soils Map**
5) **Fig 3 Post Subbasin Map**

A-4 Selected Soils Data
A-5 Isopluvial Maps

Appendix B files

B-1 Minimum Requirements #1 -#9 – Responses for Section B TIR
B-2 Flow Control Discussion
B-3 Direct Connection to Lake

Appendix C files

C-1 Proposed Drainage Subbasins with Treatment Approach Listing
C-2a Historic HCAD Results - first portion
C-2b Historic HCAD Results -second portion
C-3a Stormwater Analysis – HydroCAD Post Result for Wetland A and B
C-3b Stormwater Analysis – HydroCAD Post Result for Wetland C
C-4 Unconnected Runoff Areas – Reduced CN Approach
C-5 Storm System Discussion and Details
C-6 Stilling Well and Sizing

Appendix D files

- **D-1 References – Wetlands**
  - **D-1a Wetland Hydroperiod Analysis**
  - **D-1b Chap13 Wetland Hydroperiods King Co.**

D-2 Wetland Hydroperiod Analysis –selected text and project comment
D-3 Ch 13 – selected text with highlighting and project comment
D-4 Wetland Protection Discussion

Appendix E files

- **E-1 -3 Treatment Related Material**
  - **E-1 Treatment Evaluation Criteria – Reference: TAPE and CTAPE - selected text from DOE site**
  - **E-2a Soil Amendments to Enhance Phosphorous Sorption**
  - **E-2b Media depths for removal credit**
  - **E-3 HCAD_MN-Simple-Method**

E-4 Simple Method Description with Analysis for Wetland B

Appendix F files

F-1 Geotech Report

Parklands Executive Residential Subdivision and Parklands Business Park

Section A – Project Overview

The "**Parklands Executive Residential Subdivision and Parklands Business Park**" proposal is to subdivide two existing parcels of land into business and residential development, totaling approximately 36.4 acres. The property, tax parcel numbers 986031650 and 175948000, are located in a portion of the SW and SE ¼ Section 28, Township 2 North, Range 3 East of the Willamette Meridian, Clark County, Washington into 42 single family residences within the R-15 Zone and up to 6 commercial buildings in a mixed use/ Business Park zoning.

The property is currently undeveloped. The site topography slopes from the south, northeasterly towards the north boundary, more specifically towards the wetlands that extends southeasterly across the site (north ⅓) leaving a portion of upland area at the northeast corner that is fairly flat. The majority of the natural runoff is overland, flowing from the south, northeasterly, toward the wetland areas. The site is currently covered with trees and brush.

There are several culverts located onsite, apparently to convey surface runoff across paths or trails or former field roads. These culverts will be removed as part of the site grading. There are four specific culverts at areas that separate the three onsite wetland areas. These culverts will be retained.

Construction of the "**Parklands Executive Residential Subdivision and Parklands Business Park**" will consist of grading approximately 23.5 acres for construction of private streets, sidewalks, 42 single family residential lots, underground utilities, and stormwater mitigation facilities (quality control). Parking areas and loading docks will be constructed with the business park portion including utilities and stormwater mitigation facilities (quality control).

This stormwater report and design also considers the addition of stormwater from future Camas Meadows Drive and the Village at Camas Meadows sites. The design provides capacity to handle this off-site flow from both of these areas.

Due to soil properties in this area it is unlikely stormwater management by infiltration as the primary BMP method will be applicable, but some minor use of infiltration through LID design may be used in the final design. The geotechnical report also indicates that:

> *Weathered and competent conglomerate bedrock was encountered in all test pits at various depths… The bedrock consisted of angular to sub-rounded clasts of various sizes cemented in a matrix of sand, silt, and clay. The bedrock was very dense and excavator refusal was noted at various depths as indicated in Table 1 in Section 5.7, Excavation.*

The design of the proposed stormwater system was influenced by the suitability of the existing site topography. Typically, this type of setting would lend itself to stormwater management within the wetland buffer(s). However, the buffers along these wetlands are treed in most areas and tree preservation has been taken into consideration. There is also a requirement for phosphorous control. Presently, DOE has only certified a few treatment technologies through the TAPE program that meet criteria for phosphorous removal. One certified product has is the Filterra® System.

There are several other treatment facilities that have been demonstrated to achieve significant phosphorous removal, but are not presently certified under the TAPE program. This option might be suitable for several proposed on upland sites – Bioretention Facilities (business parcel and along Camas Meadows drive). These Bioretention Facilities will be further 'enhanced' with phosphorous removal soil amendments.

Another consideration for the site was to provide some wetland enhancement in Wetland B, however, even though this is a possible stormwater treatment and possible control method for the site, it was determined that there were too many regulatory issues that could delay or impact getting approval. **Thus, no stormwater controls or treatment are proposed in the wetlands or in the wetland buffers**. This wetland presently drains directly to Wetland A via two 12 inch diameter culverts at a road crossing. The elevation change from the delineated east end to the outflow invert to Wetland A is 6 feet (192 to 186). By retrofitting the outfall, a shallow ponded area would be developed to elevation 190. This created feature would be similar to Stormwater Wetland Treatment Facilities (SWTF) - but more natural in this case. This natural area would provide a polishing aspect for treatment. The option for ponded water at Wetland B with a static water surface could have been beneficial for maintaining hydration for the wetlands. However, there are too many regulatory roadblocks and processes to achieve, thus, this approach was abandoned for a more traditional stormwater approach.

Private Street Right of Way Stormwater Management

NW 10th Fairway Drive

The runoff will be collected at a single low point catch basin and conveyed (Storm Line A) to a Filterra® System located at the northwest edge of the lower parking area. Runoff from the parking area at Building 1 and some for building 2 and part of the lower parking area will also be treated at this structure prior to release to the wetland buffer.

NW Golf Drive

There are two storm collection systems being proposed for part of the private street system. One system will collect and convey the untreated portion of NW Golf Drive (Storm Line C). The other system (Storm Line E) will collect runoff from some of the lots and the roof water from buildings 4A and 4B (not needing treatment). Runoff from the parking lot area that has been treated with a Filterra® System will also be conveyed to this same system The untreated portion will be routed to a Filterra® System and then connected to the 'clean' pipe system (Storm Line D).

The outfall for both systems will be the existing south culvert that crosses from wetland B to Wetland A. The outfall from this connection point on the existing 12 inch culvert will be increased in size from 12 inches to 36 inches.

NW 17th Green Drive and NW Parklands Trail

Each side of 17th and Parklands will drain to Filterra® Systems which will route (Storm Line F) the outflow to the existing north culvert that crosses from Wetland B to Wetland A.

Private Individual Lot Stormwater Management

Individual lots will disperse roof runoff onto the specific lot for runoff directly overland to the wetland buffer. Lots that do not border the wetland buffer areas will collect runoff from the pervious and impervious areas (including roof areas) in one or more inlets on the lots and be conveyed to the associated wetland and be dispersed through the wetland buffer.

For lots that are not located at or near the wetland buffers, the collected runoff from each lot will be conveyed in a separate storm piping system (Storm Line D) – separate from the public street collection system. This separate system for the lots will be used to dispose of 'clean' stormwater runoff from the developed residential lots directly to Wetland A. See discussion for this system under NW Golf Drive.

To reduce the stormwater runoff quantity impact to the wetlands, this project is proposing for areas with soils running to the wetlands to be amended or replaced with a resultant soil type with runoff characteristics of a hydrological soil group (HSG) type B. This design aspect will re-supply the interflow feature back to the soil profile – which is important for hydrating the wetlands.

Section B – Minimum Requirements

The "**Parklands Executive Residential Subdivision and Parklands Business Park**" proposal contains only one threshold discharge area (TDA) and is subject to consideration of minimum requirements 1 – 10. However, only requirements 1-6, 9 and 10 are applicable. See Appendix B-1.

Table B -1 - Summary of Land Disturbing Activities

The defined site area is 36.4 acres.

1. Amount of Existing Impervious surface	None
2. Amount of New Impervious surface*	11.43 ac.
3.Amount of Replaced Impervious surface	None
4. Amount of Native Vegetation converted to lawn or landscaping	12.03
5. Amount of Native Vegetation converted to pasture	None
6. Amount of Native Vegetation converted to pervious access area	None
7. Total amount of land-disturbing activity	23.46 acres

* Roofs and drives at individual lots assumed at 4,500 sq ft per lot on this project

This project includes a design for management of runoff from offsite areas located upslope from this project and which presently drain overland to and through this site. The defined **drainage area** is 71.22 acres

- Includes The Village at Camas Meadows, Camas Meadows Drive from Payne Road to Larkspur, and an area between Larkspur and The Village at Camas Meadows.

1. Amount of Existing Impervious surface	None
2. Amount of New Impervious surface*	23.61 ac.
3.Amount of Replaced Impervious surface	None
4. Amount of Native Vegetation converted to lawn or landscaping	20.73
5. Amount of Native Vegetation converted to pasture	None
6. Amount of Native Vegetation converted to pervious access area	None
7. Total amount of land-disturbing activity	47.34acres

* Roofs and drives at individual lots assumed at 4,500 sq ft per lot on this project

Table B-2 - TDA Minimum Requirement Summary

TDA Number	Req'd to meet runoff control (treatment) requirements listed in Min. Requirement 6	Req'd to meet flow control requirements listed in Min. Requirement 7	Req'd to meet wetlands protection requirements listed in Min. Requirement 8
TDA # 1	Yes	N/A – large water body	Yes

The effective impervious area for the street ROW portion is 11.43 acres. This includes the driveway entrance portion area for each lot.

Section C – Soils Evaluation

The "Soil Survey of Clark County, Washington" indicates the soil at this site consist of the following:

(HcB) Hesson clay loam, 0 to 8 percent slopes, (HcD) Hesson clay loam, 8 to 20 percent slopes.

Clark County GIS indicates that the site soils are designed as Soil Group 2 – Well Drained Soils for use with the Western Washington Hydrology Model (WWHM2012).

See the soils map in Appendix A for additional information

According to the NRCS web soil survey,
Excerpt from Geotechnical Report:

The Web Soil Survey (United States Department of Agriculture, Natural Resource Conservation Service [USDA NRCS], 2013 Website) indicates the site is underlain by three soil types. Hesson clay loam soils are mapped on the majority of the site from the northwest corner to the southwest corner of the property, while Cove silty clay loam and Lauren gravelly loam soils are mapped in the north and northeastern portions of the property respectively. Soils resembling the Lauren series were not encountered during subsurface excavations.

Although actual on-site soils may vary from the broad USDA descriptions, Lauren soils are generally coarse-textured, well drained soils with rapid permeability. Cove soils are generally fine-textured, poorly drained soils with very slow permeability and high shrink-swell potential. Hesson soils are fine-textured, well drained soils with moderately slow permeability and moderate shrink-swell potential.

Clark County has further segregated this soil group as a Group 2 soil (SG-2) for application in analysis by the Western Washington Hydrology Model software. This soil is also classified as a type A-1-b soil by the AASTHO.

Subsurface infiltration testing was not performed but could be if other LID measures are deemed necessary in the final design. See report in Appendix F.

Section D – Source Control

There are not any prohibited discharges planned for this site. A SWPPP will be developed for the Final TIR that will further identify and list BMPs for Source Control and will include BMPS to prohibit sediment laden runoff from leaving the site and impacting any local or State waters. In addition, BMPs will be implemented as necessary to prevent pollutants from coming in contact with stormwater.

The proposed site is being developed with activities that are pollution generating. The following BMP categories have some degree of applicability, in particular, BMPs for Landscaping and Lawn/ Vegetation Management and Maintenance of Stormwater Drainage and Treatment Systems.

All source control BMPs in the public right-of-way will be the responsibility of Camas City forces per their established maintenance procedures. The stormwater facilities will be publicly owned and maintained in a manner consistent with the Stormwater Facility Maintenance Manual and BMPs for Landscaping and Lawn/Vegetation Management.

Individual lot owners will be responsible for source control BMPs related to installing and maintaining landscaping and roof downspout systems on their respective lots. This responsibility includes the prevention of introduction of pollutants into their system(s). Application of appropriate maintenance measures will also provide source control.

Additional Reference: SMMWW, Volume IV, Chapter 2 - Selection of Operational and Structural Source Control BMPs; 2.2 Pollutant Source-Specific BMPs

BMPs for Dust Control at Disturbed Land Areas and Unpaved Roadways and Parking Lots

BMPs for Landscaping and Lawn/ Vegetation Management

BMPs for Maintenance of Stormwater Drainage and Treatment Systems

BMPs for Urban Streets

Section E – Onsite Stormwater Management BMPs

An Erosion Control Plan(s) will be developed for implementation of BMPs to manage stormwater during grading activities will be shown on the erosion control plan.

Individual lot owners will be responsible for installing and maintaining roof downspout systems on their respective lots consistent with Volume III, Chapter 3.1.1 of the SMMWW.

Section F – Runoff Treatment and Design

1) Basic stormwater treatment is required for the private streets in this project.
2) Enhanced stormwater treatment is required for the business portion of this project.
3) Phosphorous removal is also required. See Appendix D

The runoff streams requiring treatment will be routed to specific Filterra® Systems. The systems will be off-line in nature and be sized to treat the off-line flow rate determined from WWHM2012 analysis.

The management of flows above the WQ flow rates will be directed to the particular storm line system for controlled release to Wetland A. The existing site release is from Wetland B to Wetland A which will then flow overland north into Lacamas Lake. A small portion of the site will continue to flow or have direct release to Wetland C which extends east and has an east to northeast release path.

Initial installation cost and the expenses associated with long-term maintenance are expected to be typical of projects with similar street sections at these slopes and no runoff from interior lots. There are no pollution-generating pervious surfaces (PGPS) on this project. The amount of pollution-generating impervious surfaces (PGIS) is:

Parklands = 11.43 acres.
Camas Meadows Drive = 1.32 acres
The Village = 6.00 acres
Larkspur = 0.46 acres
The total is 19.21 acres

Section G – Flow Control Analysis and Design

Flow control facilities are not required for this project since the discharge is to an exempt water body – Lacamas Lake*. Even with the exemption, the project still provides some voluntary and additional storm controls that will still reduce the peak flow rates and volumes. There are several design features proposed that will 'reduce' peak flow rate and volume.

a) Soil amendment or replacement to replicate HSG B soil characteristics.
b) Employ bioretention systems – the filter media depth and infiltration rate will 'delay' these flows by as much as 4.5 hours. This option may not be approved as the phosphorous removal method has not been certified through TAPE. Other states, Minnesota in particular, have developed specifications and accepted removal percentage rates.

To check the possible impact of no flow control, the historic runoff and the post-development hydrographs were compared. The storage parameters and outlet channel for the wetland were developed based on GIS contour data and the same input was used for each model. See Appendix C-4 and the observations deduced from these plot comparisons. This is significant in evaluating whether or not there is a significant rise in the water depth in the wetland and also for the duration of the rise. These hydrographs indicate that the changes in these parameters are of no significant impact to wetland hydroperiod (see Section I). The data from this analysis is also important from the aspect of no erosive impact to the existing release path. This is part of the requirement for being considered as 'directly connected' to a large water body. See appendix B-2 and B-3.

* The discharge from the site is mostly overland to the north with a direct connection to the mouth of Lacamas Creek or the upper end of Lacamas Lake since Lacamas Lake is a man-made impoundment. The release point is into the water level established by the water level at the lake. This is an area within the backwater condition for Lacamas Creek as it enters the Lake and is subjected to the lake level – (especially for times of significant flow).

Section H – Flow Control System Plan

This project is exempt as discussed in Section G.

Section I – Wetlands Protection

For projects with stormwater discharges to a wetland, either directly or indirectly through a conveyance system, the preliminary TIR shall describe wetland protection measures to be implemented in accordance with Minimum Requirement 8. The narrative shall describe the measures that will maintain the hydrologic conditions, hydrophytic vegetation, and substrate characteristics necessary to support existing and designated uses.

Listed below is the Minimum Requirement #8 from the 2012 SMMWW Volume I, Chapter 2.

The Minimum Requirement #8 is applicable to this site because the stormwater discharges are into wetlands, some directly and some indirectly. In evaluating what measures that would provide wetland protection the following documents were reviewed:

1) Minimum Requirement #8 from the 2012 SMMWW Volume I, Chapter 2.
    - 2.5.8 Minimum Requirement #8: Wetlands Protection which references Guide Sheet 1B in Appendix I-D

2) Section 4 Management of Freshwater Wetlands in the Central Puget Sound Basin
CHAPTER 13 MANAGING WETLAND HYDROPERIOD:
ISSUES AND CONCERNS

Historically, the area with runoff to this portion of the wetlands was larger than the present condition. Development of offsite parcels to the west of the site along the west boundary has previously diverted flow to an area west of the project and an area in the southeast has been developed as several subdivisions with separate stormwater facilities. The watershed area to this portion of the wetland complex has been reduced from about historically 94 acres to a current area of about 71acres (almost a 25% reduction in area).

Presently, stormwater runoff enters the three wetland segments as overland flow or as direct rainfall. The expected area for stormwater runoff is:

Source Area	Acres
Parklands Executive Residential Subdivision and Parklands Business Park	26.17
The Village at Camas Meadows	17.31
Camas Meadows Drive	2.40
Offsite – east of The Village at Camas Meadows and west of Larkspur Dr.	14.4
Wetland A (including buffer)	7.96
Wetland B (including buffer)	2.71
Wetland C (including buffer)	0.27
Total	71.22

One of the design elements is to maintain the overland flow aspect – all lots directly bordering the wetland buffers will maintain direct overland runoff. Runoff (considered clean) from the remaining lots not bordering the wetland buffers of this development will be collected and routed to several discharge points.

Several measures to reduce peak flow and hydrograph timing were briefly discussed in Section G.

Regarding *"measures that will maintain the hydrologic conditions, hydrophytic vegetation, and substrate characteristics necessary to support existing and designated uses*", the second reference seemed to provide some data that is helpful in making this assessment.

It provides the following definitions regarding processes that were evaluated.

Hydroperiod

Refers to the depth, duration, frequency and pattern of wetland inundation has been determined to be a key factor in determining biological responses

Water Level Fluctuation

WLF is measured as the average difference between the maximum depth and average instantaneous or base depth in a time period (Taylor 1993, Taylor, Ludwa and Horner 1995).

Excursion

The frequency of storm events was measured in a hydroperiod by defining an event a water level increase above the monthly average depth of more than 0.5 ft.

Duration

defined as the time period of an excursion

The cited paper also provides recommendations:

The result of these findings has been to recommend for there to be limits on the durations of storm events as well as the frequency of excursions, when wetlands will be affected by changes in hydroperiod.

- *The recommendations are that the frequency of water levels greater than 15 cm. (0.5 ft.) above pre-development levels be limited to an annual average of six or less per year and that the durations of water levels greater than 15 cm. (0.5 ft.) above or below pre-development levels be limited to less than three days per excursion.*

Water Level Fluctuation and Excursion

The Western Washington Hydrology Model (WWHM12) was run to determine some data that might be useful in evaluating these conditions. This model does analyze for wetland fluctuation but is not appropriate for this site as it extends offsite in two directions, is within a 100-yr floodplain, and has a natural positive outfall. Also it has several trail crossings with culverts located onsite and offsite. The historical condition model evaluation was based on the forested condition and the post condition include the two proposed developments and full development of Camas Meadows Drive from the south property line to the west property line and the 14.4 acres noted in the tabulation of source areas.

The daily peak runoff values and total daily volume values for the entire statistical period can be exported and listed as a .cvs file and then sorted/rearranged in highest to lowest value order.

Daily Runoff Volume - 1948 to 2008
WWHM12 Output

Sorted and Arranged in order - largest to smallest value
- just selected values over 1 ac-ft for tabulation

501 POC 1 Predeveloped flow (ac-ft)	801 POC 1 Mitigated flow (ac-ft)	Volume difference (ac-ft)	Listing Order
7.704892	11.62547	3.920578	1
7.13533	8.846004	1.710674	2
7.053172	8.161861	1.108689	3
6.884727	8.001134	1.116407	4
6.616997	7.800867	1.18387	5
6.017971	7.770435	1.752464	6
5.812159	7.690884	1.878725	7
5.498548	7.652763	2.154215	8
5.462435	7.356307	1.893872	9
5.289605	7.083555	1.79395	10
5.273884	6.935104	1.66122	11
5.234668	6.924686	1.690018	12
5.220907	6.846447	1.62554	13
5.088735	6.752748	1.664013	14
4.969435	6.573609	1.604174	15
4.848972	6.044921	1.195949	16
4.832914	5.896989	1.064075	17
4.719046	5.780949	1.061903	18

Notes: The wetland area onsite is approx. 7.5 acres

1) The 100-yr precipitation amount is 5.3 inches (isopluvial data)
2) The direct rainfall volume is 3.31 ac-ft
3) The tabulated volumes per WWHM evaluates the total volume – but is not routing it through the wetland – the information is like filling a flat container with no outlet

The largest daily difference is 3.92 ac-ft

This amounts to a depth of 0.52 ft on 7.5 acres of wetland (flat)

The second largest difference is 1.7 ac-ft

This amounts to a depth of 0.227 ft on 7.5 acres of wetland (flat)

Conclusion – Wetland Protection - Water Level Fluctuation and Excursion

- Since the outflow is occurring – initially from the start of the rainfall event - the small added depth likely increases the outflow rate only very slightly. The analysis indicates that the depth impact in the wetland is less than 0.5 feet for this worst case event in the 60 year data set.

Duration

Meeting the criteria related to duration for this site is easily demonstrated with a single event model. This is intuitively evident since this particular site has such a positive outflow condition. A single event analysis allows the option of setting a time span that exceeds the 24-hr rainfall time period. This allows the software to show the outflow hydrograph and essentially the drain down time if the runoff were being routed through a detention type facility. The onsite wetlands do provide an aspect of natural storm flow assimilation and detention as the flow through the wetlands is impacted by grassy vegetation and a meandering path and a result is likely quite slow. However, exact topography for this mostly offsite area is not available and it would be impractical to obtain.

A cursory 100-yr, 24-hr analysis was made with an assumed existing onsite wetland storage scenario and outlet simulation. The post –development analysis indicated a peak water level difference of 0.09 ft above the model with forested conditions input and the same wetland storage and outflow input. Looking at the output for the time span of 48 hours - the historic model had returned to a depth of 0.02 ft and the post-development had retuned to 0.07 ft depth above the starting storage elevation. The storage range input was 1.5 ft depth which was the depth for the post development analysis with the assumed storage input. This analysis disregards the impact of the 100-yr flood, since part of this wetland could theoretically be impacted. However, as seen from an infrared aerial photo taken during the 1996 100 year Flood Event, the flood waters barely left the main channel of upper Lacamas Lake by a hundred feet, and based on this the likelihood that a 100 year event flood would reach the site boundary seems improbable. (See 1996 Photo Attachment)

Conclusion – Wetland Protection

- Based on the findings noted, the issues and concerns regarding wetland impacts affecting the hydroperiod, are not of a nature that violate proper wetland protection.

See Appendix D-4 for some requirements/criteria related to wetlands and responses on how this project meets these criteria and mitigation measures proposed with this project.