



Canyon Lakes Anti-degradation Analysis

Canyon Lakes, Bainbridge Township, Geauga County, Ohio

October 2014

Prepared for:
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Section 401 Water Quality Certification Individual Permit Application

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Table of Contents

1.1 Project Description 1
1.2 Avoidance 2
1.3 Minimization 4
1.4 Magnitude of the Proposed Lowering of Water Quality 5
1.5 Technical Feasibility and Cost Effectiveness 8
1.6 Economic Consideration 9
1.7 Cumulative Impact 9
1.8 Indirect Impacts 10
1.9 Construction Storm Water Management Plans 10
1.10 Post-Construction Storm Water Management Plans 10

1.1 Project Description

This document was prepared in support of an application to the Ohio Environmental Protection Agency (OEPA) for a 401 Water Quality Certification Permit by Canyon Lakes Colony Company (Applicant) for Canyon Lakes (Project). The proposed Project site is located in Bainbridge Township, Geauga County, Ohio.

The Preferred Degradation Alternative (PDA) has been designed to minimize impacts to wetlands, streams, and overall surface water quality within the Project site, while still allowing a reasonable return on the Applicant's investment.

With the PDA, wetland impacts have been limited to a total of 1.42 acres, with 3.56 acres (71.5 %) of the overall on-site wetland acreage preserved/avoided. The impacted wetlands are primarily to forested Modified Category 2 wetlands (1.30 acres), with minor impacts to emergent and scrub/shrub wetlands (totaling 0.118 acre).

Stream impacts have been limited to 509 linear feet (LF) with 11,473 LF (or 95.8%) avoided and provided protection either through a conservation document assigned to either the homeowners association, or deed restrictions for individual lots. The limitation of the stream impacts has been accomplished by the use of three-sided box culverts for four of the eight stream crossings. For the unavoidable use of traditional culverts, the Applicant will use oversized, oval culverts that will allow the stream to develop a natural bottom, thus replacing the natural functions of the streams. The culvert shall be designed and sized to accommodate bank full discharge and match the existing depth of flow to facilitate the passage of aquatic organisms. When practicable, culverts shall be installed at the existing streambed slope, to allow for the natural movement of bedload and aquatic organisms.

The Applicant is planning to start the construction of the Canyon Lakes development as soon a permit is issued, with a completion date within one year of the start date. Off-site mitigation will be completed prior to the start of development. On-site mitigation will begin either before or concurrently with the onset of authorized wetland or stream impacts. Construction will conclude by the end of that calendar year, or by an approved extension.

Restoration of McFarland Creek is proposed to address stream mitigation for this project. McFarland Creek is the receiving stream for all of the Canyon Lakes streams and the reach of McFarland Creek that is proposed to be restored is within 0.5 mile of the project. This restoration location was chosen based on the fact that McFarland Creek is actively shifting its channel to the west. This constantly eroding bank is creating an unstable bank, contributing to downstream sedimentation, impacting water quality, degrading downstream invertebrate and fish habitat, endangering property, and exposing a main sewer line located near the west bank. This channel migration is a result of increased flows from past development within the watershed in combination with the absence of any natural bank stabilization along the western bank. The restoration of the stream will include re-establishing the channel closer to the original channel location, and stabilization of the new channel and bank, using natural channel design. In addition, the floodplain will be expanded providing increased flood storage and enhanced habitat within the riparian zone. This stream mitigation project will stabilize the banks and reduce erosion thus resulting in a significant reduction in downstream sedimentation. Downstream sedimentation can be expected to carry a significant distance downstream, with riffle habitat negatively impacted by sediment deposition and increased turbidity during storm events, negatively affecting water quality. This mitigation project will also protect both streamside property and the integrity of the mainline sewer located between McFarland Creek and the adjacent homes to the west.

A Minimal Degradation Alternative (MDA) has also been designed for this Project. The MDA plan minimizes impacts to wetlands, streams, and overall surface water quality within the Project site. With the MDA, wetland impacts total 1.42 acres, with 3.56 acres (71.5 %) of the overall on-site wetland acreage preserved/avoided. The impacted wetlands are primarily forested Modified Category 2 wetlands.

To reduce proposed stream impacts, shorter culverts have been considered. Specifically, this alternative uses a shorter culvert in Stream 4. This culvert requires larger headwalls at the ends of the culvert. These headwalls must be excavated into the slope, resulting in a large drop in elevation relative to the adjacent land. To ensure that this area is safe, it will be necessary to install fences/barriers to protect pedestrians. The installation of the headwalls also adds significantly to the cost of the culvert.

Stream impacts have been reduced to 479 LF with 11,503 LF (or 96.1%) preserved/avoided. The remaining stream impacts could not be reduced in a similar fashion as the existing ground topography and final design slopes for the stream crossing would result in large and bulky headwalls. These large headwalls would be located within single family lots, which is expensive for the homeowner to maintain and would be unsafe to have on a homelot.

The MDA would also provide a significant increase in environmental benefit, as there will be long-term protection for the avoided resources, through a combination of environmental easements held by the homeowners association and deed restricted lots.

The minimum project objectives consist of construction of an economically viable residential development within the Project boundary. In order to meet these objectives, further avoidance of the wetlands and streams is not possible due to the location of the water resources. Further, avoiding this wetland, or portions of the wetland would result in a loss of project income that would reduce the return on the investment to below a reasonable level and as such, this is not a financially practicable alternative. The majority of the water resource impacts are to Wetland S. This wetland crosses through a proposed road and several building lots. Maintaining a portion of this wetland would result in a small fragmented remnant of little functional value.

1.2 Avoidance

A total of 27.9 acres of open area will be avoided and protected including 24.7 acres of upland buffers and 3.2 acres of wetland. In addition, 7.5 acres of open area will be protected on private lots. Within the project boundary, 586 LF of McFarland Creek and 10,887 LF of headwater stream will be preserved.

The Non-degradation Alternative (NDA) is the only way to implement the proposed project without impacting water resources. Development under the NDA would result in six 3-sided box culverts for stream crossings, or if not technically feasible (due to length, angles and width), with bridges, thus avoiding all stream impacts. The NDA would reduce the number of homes lots to 101, and will reduce the footprint of some houses to avoid impacts to wetlands. The use of 3-sided box culverts and bridges would require an excessive increase in development cost while the loss of home lots would reduce the project revenue. As such, the NDA is not a financially practicable alternative.

The Applicant also evaluated four off-site properties to determine if these sites can be developed in a practicable manner, and can be constructed with decreased impacts to aquatic resources. The term practicable means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

To determine the practicability of the offsite alternatives, these sites were evaluated using the following criteria: 1) target market; 2) proximity to major highways and retail stores; 3) site size; 4) site constraints, including environmental features; 7) financial costs; 8) zoning; and 9) availability for purchase.

The applicant reviewed the availability of land within a ten mile radius of the proposed site that could accommodate a similar development to Canyon Lakes. After properties were identified, an environmental review of the alternative sites was done to determine if wetlands or streams were either present or potentially present on the specific site. Resources reviewed include soil survey information, aerial photographs, U.S. Geologic Topographic (USGS) maps, USGS StreamStats, and National Wetland Inventory (NWI) maps.

Site 1 is located east of Chillicothe Road, South of East Washington Street, and west of Haskins Road in Bainbridge, Ohio. The site is surrounded by residential and recreational areas. The land in this area is currently not listed for sale, would require acquisition of multiple properties, and is currently zoned for large lots. The site is underlain by non-hydric soils with hydric inclusions (Orrville silt loam, frequently flooded, Wadsworth silt loam, 2 to 6 percent slopes). A stream, draining first into Lake Lucerne, then into McFarland Creek, identified by StreamStats, is present on the site.

Site 2 is located directly east of Snyder Road, south of Stafford Road, and approximately ½ mile north of Washington Street in Bainbridge, Ohio. This site is surrounded by rural, residential, and commercial land use. The land within Site 2 is currently not listed for sale, would require acquisition of multiple properties, and is currently zoned for large lots. The site is underlain by non-hydric soils with hydric inclusions (Wadsworth silt loam, 2 to 6 percent slopes).

Site 3 is located east of Frost Road, approximately ½ mile north of Twinsburg Warren Road, in Aurora, Ohio. This parcel is for sale and is comparable in size to the Project property, but the site is currently being used for a sand and gravel operation and is not preferable for residential development. In addition, the site is not in close proximity to major transportation corridors or retail stores. The site is underlain with both hydric soils (Carlisle muck, Damascus silt loam, Linwood muck, Olmsted loam, and Sebring silt loam), and non-hydric soils with hydric inclusions (Fitchville silt loam, 2 to 6 percent slopes). This site has a stream which drains into the Black Brook Ditch eventually entering the Cuyahoga River.

Site 4 is located east of Rapids Road, approximately one mile north of Winchell Road in Hiram, Ohio. This parcel is for sale, but is about ½ the size of the project and is zoned for large lots. In addition, the site is not in close proximity to major transportation corridors or retail stores. The site abuts the Cuyahoga River, and is underlain with both hydric soils (Sebring silt loam), and non-hydric soils with hydric inclusions (Jimtown loam, 0 to 2 percent slopes).

Available sites with comparable acreage to this Project were very limited; only two of the four sites located are currently available. Acquisition of the remaining two sites would require purchasing multiple properties and it is unknown if the current property owners would be willing to sell.

In review of water resources on these alternative sites, excluding Site 2, all properties have streams leading to Traditionally Navigable waters.

As indicated on the soil survey maps, all of the alternative sites are underlain by somewhat poorly drained to poorly drained hydric soils or non-hydric soils with hydric inclusions, which indicates a high potential for the alternatives sites to support wetlands.

In summary, of the four sites evaluated, the first two locations, Sites 1 and 2, have the most comparable qualities to the Canyon Lakes location. However, these sites are currently not for sale, the other two alternative locations, Sites 3 and 4 are for sale but they are located in less desirable areas. These sites are not in close proximity to major transportation corridors essential for commuters and the lack the availability of basic amenities and retail options close by.

In review of the alternative analysis, the Canyon Lakes site is the most feasible site available for the Project. The main factor leading to this conclusion is that the Applicant has owned the Project site for over 25 years and as such, the use of an alternative site would require the additional cost of land purchase. This, in and of itself, financially eliminates the use of alternative sites. In addition, the desirable conditions of the Canyon Lake site; surrounding amenities; and easy access to State Route 422, Chagrin Road, and Chillicothe Road, have proven to be key elements in the success of adjacent residential developments. Finally, the site is included in a 1999 Settlement Agreement that incorporated Project site into the Canyon Lakes PUD allowing the property to be developed utilizing smaller lot sizes and clustering.

If the Canyon Lakes development was not built, there would be multiple consequences for the developer, the existing residents, and the community at large. For the developer, there would be major financial impacts. These impacts include a loss of revenue from sales, as well as a significant amount of time, energy, and money that has been put into the design of the Canyon Lakes development.

The costs to existing residents are both financial and social. Many of the current residents purchased homes in this area with the expectation of the future growth of their neighborhood creating a stronger community. If Canyon Lakes is not built, this vision of a neighborhood will not be fulfilled. There is also a financial cost to the residents. The first and more prevalent is the substantial increase in annual fees for each resident because the development will not attain the housing density needed to maintain the property.

Furthermore, either the County or residents located adjacent to the proposed stream mitigation site will have to fund the stabilization of the McFarland Creek bank that is threatening the integrity of the mainline sewer and the residential lots.

The Chagrin Falls community will also be affected through the loss of tax revenue and the loss in potential residents that would help to expand the growing community.

1.3 Minimization

This project has been designed to minimize impacts to water resources to the greatest extent practicable. As designed, the Project will result in a total of 509 linear feet of stream impacts, avoiding a total of 11,982 feet of stream. The development has been carefully designed such that the stream impacts are limited to road crossings which are necessary to provide access to this site. To further minimize stream impacts, 3-sided box culverts will be used for four of the crossings. The remaining four crossings will use over-sized culverts. These culverts shall be sized and installed to accommodate bank full discharge and match the existing depth of flow to facilitate the passage of aquatic organisms.

When practicable, culverts shall be installed at the existing streambed slope, to allow for the natural movement of bedload and aquatic organisms. This culvert design and installation method will allow the redevelopment of natural stream bottoms thus providing for the recovery of the natural functions of the stream.

To assess a further scaled-down version of the project that would result in no impacts to surface waters and still meet the project goals, the on-site Non-Degradation Alternative (NDA) was designed to fully avoid impacts to water resources. Development under the NDA would result in the use of six 3-sided box culverts for all stream crossings, thus avoiding all stream impacts. The 3-sided culvert configurations for streams 4, 5, 5-2, and 8-1 would require significantly longer and problematic angled, 3-sided culverts and/or bridges, as well as generally wider overall widths. The cost would therefore increase significantly for these culverts. The NDA would further reduce the developable homes lots to 101, and will reduce the size of some houses (and thus lot value) to avoid impacts to wetlands. The use of 3-sided box culverts and/or bridges would require an excessive increase in development cost while the loss of home lots would reduce the project revenue. As such, the NDA is not a financially practicable alternative.

A no-build option would also result in no impacts to water resources. However, this would deprive the Applicant of any reasonable use of the site, and would negate the court settlement (A 1999 Settlement Agreement that incorporated the 200 acres of land into the Canyon Lakes Planned Unit Development (PUD) allowing the property to be developed utilizing smaller lot sizes and clustering) the Applicant has already invested significant time, money, and other resources in procuring, thus resulting in a net loss in financial terms for this option.

The purpose of the proposed project is to construct an economically viable residential development within the Project boundary. Minimum lot size, right of way widths, curvature of roadway, setbacks, etc. are all dictated by local ordinances and the Consent Judgment Entry for this site. Building footprints and sizes are also driven by market demand. These parameters were considered when designing this site.

As part of the design process existing structural and natural features are identified, as well as topographic considerations. Utilizing the above mentioned design parameters, roadway, lots and proposed houses were located to maintain existing natural drainage corridors and avoid natural features as much as practicable. In some cases avoidance of natural features were determined to be either economically infeasible or would create an unsafe roadway design. Where stream crossings were required, each stream was closely evaluated to determine the practicability of a 3 sided culvert with natural bottom to avoid disturbance. The resulting design maintains the natural drainage corridors as well as a good portion of existing natural features while still accomplishing the purpose of the project.

1.4 Magnitude of the Proposed Lowering of Water Quality

The following water resource impacts are based on the Preferred Alternative Plan.

Stream Discussion:

The proposed project will impact a total of 509 feet of ephemeral stream, out of a total of 11,982 feet of stream found on the Project site. The impacts, however, are limited to road crossings. Of the eight total proposed crossings, 3-sided box culverts will be used for four of the crossings. The remaining four crossings will use over-sized culverts resulting in impacts to four streams. Nine of the thirteen streams found on the site will be fully avoided.

To construct the crossing for the cul-de-sac over Stream 4, a 107-foot oversized culvert will be installed. The road crossing is needed to access nine lots on this cul-de-sac. This crossing will

result in impacts to 113 feet of stream. The culvert will be installed to allow the natural streambed to re-establish and provide for the recovery of the functions of the stream so that the impacts will be temporary. Due to the depth and width of the stream valley at the point of the road crossing, a 3-sided box culvert is impracticable.

Stream 5 will be impacted due to the need to lengthen the existing culvert, which also serves as the originating point of the stream, in order to widen Northview Road and associated utilities. As a result, 51 feet of stream will be impacted. However, the entire culvert will be replaced with an oversized culvert, allowing the stream to have a natural stream bed. Another crossing of Stream 5 is proposed, but no additional impacts will occur as a 3-sided box culvert is proposed for this crossing.

To construct the main loop road for this development, a road crossing is needed over Stream 5.2. Due to the depth and width of the stream valley at the point of the road crossing, and a significant bend in the relatively wide stream bed at this location, a 3-sided culvert is impracticable. A total of 175 feet of stream will be impacted. A 165-foot oversized culvert will be installed to allow a natural stream bed to be established at the bottom of the culvert.

Because of the depth and width of the stream valley and a stream bend at the point of the road crossing at Stream 8.1, it is necessary to install a traditional culvert. Construction of a 3-sided box culvert is impracticable. A total of 170 feet of stream will be impacted with the installation of a 145-foot oversized culvert.

The streams on this site are not unique or rare within the locality or state. Based on the topography in Geauga County, the streams found on the Project site are typical headwater streams for the area.

The potential habitat value of the streams was assessed using the Headwaters Habitat Evaluation Index (HHEI). These streams assessed within the range of Class I, II, and III primary headwater habitat. The streams proposed to be impacted are within Class I or II; all Class III streams will be avoided. Class I streams have little or no aquatic life potential, except seasonally when flowing water is present for short time periods following precipitation. Class II streams may exhibit moderately diverse communities.

Because of the avoidance of the majority of the streams, the use of 3-side box culverts, and the careful design and installation of the remaining four culverts, it is not anticipated that stream biota, including fish and benthic macroinvertebrates will be impacted and no water quality degradation will occur.

McFarland Creek was evaluated using the Qualitative Habitat Evaluation Index (QHEI). Although stream biota, including fish and benthic macroinvertebrates are likely present in McFarland Creek, no impacts are proposed to this stream; therefore no habitat or water quality degradation is foreseen with the development activities proposed for this project.

To ensure receiving waters are not adversely impacted by the development activities, a number of Best Management Practices (BMP) will be employed during construction. These include but are not limited to: stabilized construction entrances and access roads, silt fencing, geotextile mats on steep grades, inlet protection, installation of sediment basins, phased development, minimization of the amount of soil exposed during construction activity, temporary stabilization of soils within 14 days of soil exposure, and establishing vegetation in drainage swales.

Four of the thirteen streams will be temporarily impacted by the development of this site. The streams being impacted on-site include 509 linear feet of headwater stream.

The impacted stream functions will be replaced and maintained by the use of oversized, oval culverts which will allow the recovery of the stream bed and substrate. As a result, the overall effect on the quality of the aquatic community structure will be temporary and minimal.

Because the impacts proposed to the streams on-site will be temporary with only a small portion of the streams being affected, the development of this site will not result in the elimination and/or significant decline of aquatic species. In addition, by maintaining a forested corridor along the non-impacted portion of the streams this will help to prevent erosion, provide shade for aquatic species, and reduce pollution from entering the water. An increase in pollution is not expected, nor is a decline in species or composition.

The proposed impacted streams found on the Project site are typical headwater streams for the area with no value in regards to recreation, tourism, or commercial activities. Since part of the appeal of the Project site is the natural environmental, the streams do possess potential aesthetic value for future residents of the Canyon Lakes property. In order to ensure long-term benefits of the streams on-site, the Applicant has designed the Project to preserve and avoid as much stream as possible. Where avoidance was not possible, impacts were minimized.

Wetland Discussion:

The functions and value of the wetlands were evaluated using the Ohio Rapid Assessment Methodology (ORAM). Three wetlands totaling 1.418 acres will be impacted in the development of this project. All three wetlands being impacted assessed within the range of Category 2 wetlands.

Three of the nine wetlands found on the site will be impacted. Over 71% of the total wetlands, including a Category 3 wetland, will be avoided.

Wetland A-1 is an emergent, 0.04 acre, Category 2 wetland. This wetland is located too close to a steep backyard slope of two proposed residential lots to be successfully avoided. Total impacts will be 0.04 acres.

Wetland A-2 is adjacent to Stream 5-2. It is a small, 0.26 acre emergent and scrub/shrub, Category 2 wetland. This location is the most appropriate location for a road entrance to the cul-de-sac road for 9 residential homes. Moving the entrance in either direction will not reduce impacts. The wetland impact is 0.078 acres.

Wetland S is a 1.30, Category 2, forested wetland that cannot be avoided. This wetland intersects a road crossing for the main road loop going through the development. The wetland is also located where four large residential lots are planned within the development. Avoiding even part of the wetland would leave an isolated and fragmented remnant wetland that would be difficult to maintain because of loss of hydrology inputs.

Because of the geomorphic position of Wetlands A-1 and A-2 there is potential for these wetland to be used for amphibian and macroinvertebrate habitat. However, due to their size, it is expected that little to no effect on overall habitat will result from impacts to these wetlands.

Because it is proposed to impact all of Wetland S, there will be a loss of forested habitat. However, this is a seasonally saturated wetland with little diversity and no connectivity to other water resources. Due to the lower quality of the habitat features of this wetland, and quantity of wetlands being avoided and preserved on the remainder of the site, the overall effects on wetland habitat are minimal.

The wetlands on this site are not locally or regionally scarce. Under the PDA plan, Wetlands A-1 and S will be filled completely as well as a portion of Wetland A-2. The remaining wetlands onsite will be avoided. All the wetlands proposed for impacts on the project site were assessed as Category 2 wetlands. Although Category 2 wetlands are considered “general high quality waters,” they “support moderate wildlife habitat, or hydrological, or recreational functions,” and are “dominated by native species but generally without the presence of, or habitat for, rare threatened or endangered species.”

To ensure the wetlands being avoided are not adversely impacted by the development activities, all necessary Best Management Practices (BMP) will be employed during construction, as said previously.

The proposed development activities are not expected to result in elimination and/or significant decline of aquatic species. Wetlands A-1 and A-2 have some aquatic function that will be lost. However, the streams adjacent to these wetlands will maintain their aquatic function. Thus effects on aquatic activity caused by the impacts to these wetlands will only be a temporary disturbance to aquatic life. With the replacement of these wetlands at over a 2:1 ratio, there will be no overall decline in aquatic life. In fact, with the increase in wetland area provided by the mitigation, there will be an increase in aquatic life

The wetlands being impacted are Category 2 wetlands totaling 1.418 acres of impacts. Due to the size, location, lack of access and quality of the wetlands, there is no value in regards to recreation, tourism, commercial activities; and aesthetic value.

1.5 Technical Feasibility and Cost Effectiveness

The Non Degradation Alternative would require 3-sided box culverts and/or bridges to avoid impacts to existing streams. For streams that significantly meander, which is the case for some of the proposed crossings, the culvert width must be very wide in order to avoid the entire stream bed and bank, resulting in a very expensive structure to build. In addition, when streams do not cross the proposed roadway at 90 degree angles, the culvert can become very long, also resulting in additional cost. Future maintenance also becomes expensive for the resulting large culverts where some municipalities will not accept them since the ongoing maintenance responsibilities fall on them.

The Minimal Degradation Alternative reduces impacts from the PDA by using a shorter culvert where the roadway crosses Stream 4. This would protect more of the stream, but would require a larger headwall at the ends of the culvert that would require a fence/barrier for fall protection as well as adding significant additional cost to the project. Future maintenance also becomes expensive for the resulting larger headwalls.

The Preferred Degradation Alternative (PDA) has been designed to minimize impacts to wetlands, streams, and overall surface water quality within the Project site, while still allowing a reasonable return on the Applicant’s investment. The limitation of the stream impacts is accomplished by the use of three-sided box culverts for four of the eight stream crossings. For the unavoidable use of traditional culverts, the Applicant will use oversized, oval culverts which are significantly less expensive than the three-sided box culverts. As mentioned in the NDA description, practicability of design, cost and future maintenance determined the use of the culvert type for each stream crossing.

1.6 Economic Consideration

As part of this submission process, the Applicant completed a socio-economic evaluation of both development costs and community economic benefits for the PDA and the MDA. See the Economics Analysis Table for a full evaluation of the economics of the Project for all three alternative site designs (Table1). The development of the Canyon Lakes site will have no adverse effect on local unemployment, poverty, or household incomes, but will improve both short-term and long-term employment in the area through construction and maintenance jobs.

The PDA has been designed to avoid and minimize water resources to the maximum extent practicable. Over 95% of the streams and 72% of the wetlands will be avoided. Three-sided box culverts will be used at four of the stream crossings. Oversized pipes will be used at the remaining four stream crossings. The total lots have been reduced from the original design. Even with the increased cost and decreased revenue, the PDA results in a practical and economically feasible alternative that balances protection and avoidance of water resources with developing a financially feasible project. The MDA, although it slightly reduces the stream impacts by 30 LF, would create a less desirable stream crossing. Although it could be done, the Applicant believes that the reduction in stream impacts is overridden by the negative concerns of that crossing, considering the safety concerns, larger headwalls, the cost, and the long term maintenance that would result from the installation of a 3-sided box culvert at the Stream 4 road crossing. This evaluation is true of the two traditional culverts proposed to be used at the road crossings of Streams 5-2 and 8-1. See the Canyon Lakes Financial Outcome Analysis (Table 2).

1.7 Cumulative Impact

It is assumed that past impacts to wetlands and streams within this watershed have occurred, as residential and commercial growths have occurred within the watershed. The development of the Canyon Lakes residential areas west of McFarland Creek were fully mitigated for with approved permits. The majority of the mitigation for those impacts was done on-site. This proposed development will not result in any significant further impact to water quality, and may even reduce the potential for further degradation of water quality as a result of the proposed on-site stream mitigation.

At present, a portion of McFarland Creek is constantly eroding and is creating an unstable bank, contributing to downstream sedimentation, degrading water quality, impacting downstream invertebrate and fish habitat, endangering property, and exposing a main sewer line located within the west bank. This channel migration is a result of increased flows from past development within the watershed in combination with the absence of any natural bank stabilization along the western bank. Sedimentation can be expected to carry a significant distance downstream, with riffle habitat negatively impacted by sediment deposition and increased turbidity during storm events, negatively affecting water quality. If the stream is not restored, a significant amount of sediment will continue to enter the waterway further degrading the water quality in the watershed.

Future effects from impacts due to the development of Canyon Lakes were assessed. Under the PDA plan, four streams totaling 509 LF will be temporality impacted during development activities. Three wetlands totaling 1.418 acres will be permanently impacted. However, a total of 27.9 acres of open area will be protected including 24.7 acres of upland buffers and 3.2 acres of wetland. In addition, 7.5 acres of open area will be protected on private lots. Within the project boundary, 586 LF of McFarland Creek and 10,887 LF of headwater stream will be preserved. As

mentioned above, 510LF of McFarland Creek will be restored.

In addition to avoidance, minimization, preservation and restoration measures, the Applicant will also be implementing a variety of storm water BMPs both during and post construction.

Since the project has been designed to protect and enhance water quality to the greatest extent practicable, negative impacts to the watershed are not anticipated.

1.8 Indirect Impacts

Indirect impacts are not anticipated as a result of the development activities of the Canyon Lakes project. As stated in greater detail in section 1.4 Magnitude of the Proposed Lowering of Water Quality, the proposed impacts will have minimal overall effect on habitat and aquatic species. Drainage patterns will only be temporarily interrupted due to the installation of the oversized culverts which are designed to allow the recovery of the stream bed and substrate. Once completed, stream drainage will be restored to pre-impact conditions.

To further minimize on-site and off-site impacts both during and after construction, the Applicant will utilize a number of BMPs. These include but are not limited to: stabilized construction entrances and access roads, silt fencing, geotextile mats on steep grades, inlet protection, installation of sediment basins, phased development, minimization of the amount of soil exposed during construction activity, temporary stabilization of soils within 14 days of soil exposure, and establishing vegetation in drainage swales. Additional measure will be taken to ensure no future indirect impacts will occur. These include but are not limited to: storm water management basins that will manage runoff volume and moderate post construction flow peaks to the receiving waters through soil percolation and controlled water storage. These control measures will ensure that peak post-development rates of surface water runoff from the site do not exceed the peak pre-development rates of runoff.

1.9 Construction Storm Water Management Plans

To address concerns of increased erosion, changing hydrologic conditions, and potential degradation of water quality, a full Storm Water Pollution Prevention Plan (SWPPP) will be created to ensure that all erosion and sediment control devices will be installed and maintained as needed to control all indirect impacts to receiving waters. The SWPPP will utilize both temporary and permanent BMPs as necessary, as discussed in the previous section.

A Notice of Intent (NOI) will be submitted to ensure the project will be in compliance with the conditions of the Ohio EPA Federal Section 402 National Pollution Discharge Elimination System General Permit for Construction. In addition, coordination with the township and/or Geauga County Soil and Water Conservation District will be done to ensure the project is in compliance with local storm water requirements.

1.10 Post-Construction Storm Water Management Plans

For long-term management of the increased storm water volume, permanent BMPs will be utilized. Storm water on this site will drain to newly constructed storm water management basins (wet/dry extended detention basin) as well as an existing storm water management basin. These storm water basins will manage runoff volume and moderate post construction flow peaks to the receiving waters through soil percolation and controlled water storage. These control measures will ensure that peak post-development rates of surface water runoff from the site do not exceed the peak pre-development rates of runoff as well as addressing the water quality volume (WQV) as required by the most recent NPDES general permit.

The wet/dry extended detention basins will handle a majority of the storm water for disturbed areas on site. The remaining areas (rear yards that cannot practically be directed to the basins) will be handled with an infiltration basin or trench at the rear of the proposed houses.

All post construction BMPs will be designed to incorporate appropriate techniques from the latest Ohio Rainwater and Land Development Manual. Preparation of a SWPPP and submittal of a NOI is required for township and/or county approval of the development.

Thus, no off-site impacts are anticipated with the development of this site as these measures will ensure that there will be no significant degradation of the receiving waters and the associated aquatic ecosystem.

All post construction BMPs will be designed to incorporate appropriate techniques from the latest Ohio Rainwater and Land Development Manual. Preparation of a SWPPP and submittal of a NOI is required for township and/or county approval of the development.

Thus, no off-site impacts are anticipated with the development of this site as these measures will ensure that there will be no significant degradation of the receiving waters and the associated aquatic ecosystem.