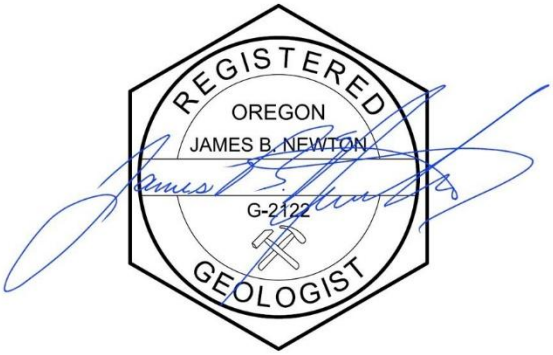
THORNBURGH RESORT
FISH AND WILDLIFE MITIGATION PLAN

ADDENDUM #2 (2022 FWMP)
RELATING TO POTENTIAL IMPACTS OF THORNBURGH'S REDUCED GROUND WATER WITHDRAWALS ON FISH HABITAT

Renews: 1/1/2027



Renews: 5/1/2026

Prepared for:

Central Land and Cattle Company, LLC
67525 SW Cline Falls Hwy
Redmond, Oregon 97756

Prepared by:

Cascade Geoengineering, LLC
21145 Scottsdale Drive
Bend, Oregon 97701

August 16, 2022
As reorganized on
January 31, 2023
Revised April 4, 2023
& May 5, 2025

Project: Thornburgh Resort

I. Introduction

This report was prepared by Jim Newton, PE, RG, CWRE, Principal of Cascade Geoengineering ("CGE") on behalf of Central Land and Cattle Company, LLC, owner, and developer of the Thornburgh Resort ("Thornburgh") as an Addendum to the Thornburgh Resort and Wildlife Mitigation Plan regarding potential impacts on fisheries and aquatic habitat and the specific measures to mitigate for any negative impacts. It incorporates elements of and replaces the "Addendum Relating to Potential Impacts of Ground Water Withdrawals on Fish Habitat" dated April 21, 2008 (the "FWMP") developed by Newton Consultants, Inc. ("NCI") and supplements thereto.

The mitigation requirements and enforcement measures are set out in Section II, below. The following section discusses the results of the mitigation measures. The remainder of the document provides background information and scientific analysis based of thermal modeling and analysis by highly qualified experts and an expert analysis of the effects of pumping and mitigation on fish and other wildlife that are dependent on the quality or quantity of Deschutes Basin rivers and streams.

II. Thornburgh Mitigation: DCC 18.113.070(D) - The No Net Loss/Degradation Standard ("No Net Loss").

The proposed mitigation measures are designed to ensure No Net Loss of habitat quantity or quality and net benefits to the resource and are comprised of four categories including:

A) Reduce water use and thus reduce impacts on the aquatic habitat (Item 1 below):
   1. limit groundwater pumping to a maximum of 1,460 AF annually, which is more than a 30% reduction in originally approved water usage.

B) Comply with the No Net Loss standard of DCC 18.113.070 (D) (Items 2-5 below):
   2. Use 1,211 AF of existing water rights described herein to authorize pumping of groundwater from wells on the Thornburgh property by transfer, cancellation or other permanent mitigation (e.g., mitigation credits).
   3. Comply with requirements for Water Right Permits, Certificates, or Transfers of water rights described herein, or others hereinafter acquired. Provide mitigation when needed in advance of pumping as required by OWRD mitigation rules.
   4. For additional supply or mitigation over the water rights specifically identified in this plan, use mitigation credits, COID mitigation, BFR surface water, BFR ground water, or any other water source in the Deschutes General Zone of Impact that will discharge water into (or leave it in) the Deschutes or Crooked Rivers or their tributaries, to supply or mitigate for any unmet needs the resort will have. The amount of water needed is the 1,460 AF of total pumping less the amount of water transferred, cancelled, or converted to mitigation credits, and:
   5. Thornburgh has provided 1.51 cfs of water in a quantity of no less than 106 AF of mitigation in Whychus Creek from the TSID diversion downstream by funding the completed TSID piping project called for by the 2008 FWMP that completely mitigates all impacts to Whychus Creek. Nothing more is required here.

C) Provide advance or excess mitigation which is not required to meet DCC 18.113.070(D)(Items 6-7 below).

6. Let unused water rights remain in the groundwater or stream to increase flows and reduce temperatures of the streams in advance of creating impacts except as provided to others for drought relief at Thornburgh's sole discretion.
7. Thin thousands of acres of Juniper forests onsite and on BLM Lands.

D) Compliance and Reporting measures.

8. Detail what constitutes compliance with this FWMP and what reporting actions are required and who will be entitled to receive them.

Section A:

1. **Limit Pumping To 1,460 AF Annually:**

Groundwater pumping for the resort does not exceed a maximum combined volume of 1,460 AF. This is more than a 30% reduction in the amount of water Thornburgh is currently approved to use. This will dramatically reduce the level of potential impacts, creating less demand and strain on the region's water resources.

Section B:

2. **Use OWRD Water Rights Certificates, Permits & Transfers for Pumping or Mitigation:**

For the purposes of this FWMP ("2022 FWMP") and compliance with DCC 18.113.070(D), it is assumed the certificated water rights in #a-d below will be transferred to and used at the Thornburgh property. Certificate 89259 (#e, below) is being cancelled in-lieu of mitigation for any Thornburgh groundwater permit granted by OWRD. The Temporary Credit from Deschutes River Conservancy (f) have been leased since 2013 and may continue until such time that Thornburgh does not require them, and the Three Sisters Mitigation water (g) has been transferred instream in Whychus Creek.

None of these water rights require additional OWRD mitigation under OWRD's mitigation program. Thornburgh presently owns items a-e which are existing water rights. Rights a-d are being transferred from their original point of appropriation (POA), which would be a groundwater well, or point of diversion (POD), which would be a diversion from surface water, to wells at the Thornburgh property, while e is being cancelled in lieu of mitigation consistent with the Deschutes Basin Groundwater Mitigation rules. Transferring a certificated water right does not require OWRD mitigation, as it eliminates the use of this transferred water right in its former location and allows it to be used, instead, on the Resort's property. Cancelling a right is done as mitigation and results in placing water back in the system by cancelling the legal right to use the water at the original point of appropriation.

While OWRD requires no mitigation for transfers, as they only change the point of appropriation ("POA"), or point of diversion ("POD"), transfers can change the point of impact where the withdrawals will be felt in the stream from one location to the other. The change from where the stream was impacted under the original POA to the points of

impact from the Thornburgh wells is the only element that could affect the No Net Loss standard and compliance with DCC 18.113.070(D). As such, CGE assessed whether changes in the POA would change the location where impacts are felt in the stream, and if so, how and to what degree that change could affect the no net loss standard and compliance with DCC 18.113.070(D).

a. **Surface Water Certificate 95746 (4/30/1902) and Transfer application T-13857** (LeBeau) –Thornburgh owns this certificate authorizing the use of 4 acre-feet per acre of irrigated land of surface water from the Little Deschutes River, a tributary of the Deschutes River, to irrigate 50 acres of land, for a total authorized use of 200 AF of water. An application for a permanent transfer, T-13857, has requested the POD of this right currently at River Mile 56 on the Little Deschutes arm of the Deschutes River to be transferred to a POA on wells located at the Thornburgh Resort, located generally west of RM 143, roughly 105[1] river miles from the point on the Deschutes River closest to the Thornburgh Resort. These proposed changes to the certificated water right do not require OWRD mitigation. Pumping has ceased and this water is currently in the river to flow from its point of diversion all the way to Lake Billy Chinook, about 137.7 river miles[2]. *See* Map 2. The added flow will provide thermal benefits that cool the Little Deschutes arm of the Deschutes River and the Deschutes River throughout those reaches.

   Compliance with this is certificate occurs as described in Section D Compliance, 1(b) below dealing with surface water.

b. **Surface Water Certificates 96192 and 96190 (4/13/1967) and Transfer T-12651 to Groundwater POA** – Big Falls Ranch ("BFR") (Deep Canyon Creek Groundwater POA). Applicant currently owns this certificated water that presently authorizes the use of 4 acre-feet of surface water per acre of irrigated lands from Deep Canyon Creek onto of 153.7 acres of land, for a total volume of 614.8 AF of water. This certificated water requires no OWRD mitigation. The POAs of this water are wells located at Big Falls Ranch. Pumping was stopped on 90 acres of this water in September 2021 and the water was assigned to Thornburgh on September 23, 2021. Pumping was stopped on the remaining 63.7 acres in 2022 and a deed conveying this water to Pinnacle Utilities, LLC, was executed on November 30, 2022. (See Exhibit A.) An application has been filed to transfer all 153.7 acres of water to wells at the Thornburgh Resort. Compliance with the FWMP has been achieved.

   All 153.7 acres of this water is in the ground at Big Falls Ranch to increase flows of 11 degree C groundwater into the stream reaches affected by the BFR wells that are also impacted by Thornburgh Pumping. This is increased flow of cool groundwater provides thermal benefits cooling the rivers and creeks. While our analysis does not

[1] The Little Deschutes arm, merges into the Deschutes River at RM 192.5 on the Deschutes River. LeBeau POD is at RM 56 on the Little Deschutes arm, which is roughly at the equivalent of Deschutes RM 246.5. The Thornburgh POA is west of Deschutes RM 143. Round Butte Dam is roughly 137.7 miles from the LeBeau POD.
[2] In 2021 Thornburgh this water placed this water instream (lease) to benefit fisheries habitat. In 2022 it was temporarily transferred to North Unit Irrigation District to provide drought relief to farmers.

rely on the flows provided by Deep Canyon Creek to achieve compliance with the No Net Loss standard, changing the mitigation source from 13-degree surface water flows in the creek (2008) to 11 degrees C groundwater flows (2022 FWMP) into areas waterways is clearly beneficial. Also not accounted for is the fact that pumping from Deep Canyon Creek has completely ceased, allowing Deep Canyon Creek to flow to the Deschutes River.

In the alternative, if not approved for transfer, this water right could be cancelled in lieu of mitigation for any groundwater permit or Limited License application to serve the Resort. Cancelling a groundwater certificate leaves the water in the aquifer so it can return to streams and rivers. Lastly, the POA could be returned to a POD in Deep Canyon Creek from where it could be transferred to an instream right with mitigation credits issued groundwater or limited license applications. Also, if this proposed transfer is not approved, and the transfer of the water below in **c.** is approved, Thornburgh will replace this water with more of the BFR groundwater rights that are not Deep Canyon Creek rights. Similarly, if the transfer in **c.** below is not approved, but this transfer is approved, Thornburgh may replace the water in **c.** with this water in (**b**). As both are being pumped from the same ground wells, there is no effect which certificate is used to appropriate the water. This water can also be cancelled in lieu of mitigation, or it can be transferred to instream use for mitigation of permit G-17036, or the alternate permit. Neither action impacts the efficacy of this plan.

Compliance with this FWMP regarding these certificates appropriated from the ground is completed as described in Section D: Compliance, 1(a).

c) **Ground Water Certificate 87558** (BFR) – Applicant currently owns 18.9 AF of this certificate authorizing the appropriation of groundwater from wells located at Big Falls Ranch to irrigate 6.3 acres. A quantity deed conveying this water to Pinnacle Utilities, LLC, was executed on November 30, 2022. An application for transfer has been filed to transfer all 18.9 AF to wells at the Thornburgh Resort. Thornburgh has filed an application to transfer all 18.9 AF to wells at the Thornburgh Resort. This certificated water requires no OWRD mitigation. Leaving this 11 degree C groundwater in the ground at Big Falls Ranch has increased flows in the same manner as the BFR water in (b) above. As noted above it cannot be converted to an instream right the same way surface water rights can although it could be cancelled in lieu of mitigation for any GW permit serving the resort as described in (b) above.

Compliance with this FWMP regarding this certificate appropriated from the ground is completed as described in Section D: Compliance, 1(a).

d) **Ground Water Certificate 94948 (1/30/1995), Transfer T-13703** (Tree Farm) – Applicant currently owns roughly 327.5 AF of water authorizing the appropriation of 0.453 cfs Year-Round for Quasi-Municipal. This certificated water right does not require mitigation. A temporary transfer T-13703 was approved by OWRD which changed the POA of this water right from wells located in the Tree Farm subdivision west of Mt. Washington Drive in Bend to wells on the Thornburgh property. It also

changed the Point of Use (POU) from the Tree Farm subdivision to Thornburgh wells. A permanent transfer has also been applied for and is in process. Pumping ceased in 2021 increasing the flow of cold 11 degrees C groundwater into the streams. The Final Order approving this transfer was issued on December 7, 2021. At present it can be used per the transfer order, or in the alternative it could be cancelled in lieu of mitigation for any groundwater permit or Limited License serving the resort.

Compliance with this FWMP regarding this certificate appropriated from the ground is completed as described in Section D: Compliance, 1(a).

e) **Ground Water Certificate 89259 (3/18/1998)** – Dutch Pacific – Applicant currently owns this certificated water right allowing the use of 3 AF of water to irrigate 16.5 acres or 49.5 acre-feet of ground water pumped from a well in Sisters. This is a certificated water right that doesn't require mitigation. The place of impact from pumping at this location is in Whychus Creek and Indian Ford Creek that flows into Whychus Creek near Sisters. Pumping ceased in 2019 allowing all 49.5 AF of water to remain inground to flow to Indian Ford Creek and into Whychus Creek. It is presently being cancelled in-lieu of mitigation. This 16.5 acres of irrigation (49.5 AF) of cool water will provide thermal benefits to the stream that will cool the creek and mitigate for most all the impacts to Whychus Creek from Thornburgh pumping (see Table 8 above). Leaving this water in the stream is like leaving the 106 AF (f below) of Three Sisters Irrigation District (TSID) water (13 degrees C) in the creek in the same area. The TSID mitigation was shown to cool Whychus Creek from its point of diversion to the Mouth.

Compliance with this FWMP regarding this certificate appropriated from the ground is completed as described in Section D: Compliance, 1(a).

f) **Temporary Mitigation Credits (DRC)** – 6 acre-feet of temporary mitigation credits from the Deschutes Resource Conservancy have been in place since 2013. For nearly 10 years these credits have increased flow to the Deschutes River in advance of pumping groundwater as mitigation for permit G-17036. Excess mitigation has been accumulating since then, further discussed in Section C page 8 below. Thornburgh may cancel the use of these temporary credits at some point in the future, although that is not required by this plan. They are not considered in the efficacy of this 2022 FWMP in meeting the No Net Loss standard.

Compliance with this FWMP regarding these credits are completed.

g) **Three Sisters Irrigation District ("TSID") Mitigation Water:** Applicant has already completed the arrangements leaving 106 acre-feet (1.51 cfs) of Whychus Creek irrigation water (surface) permanently in Whychus Creek. This is surface water diverted at the TSID diversion near the town of Sisters. See Map 2, pp., 5. It has been permanently transferred instream at that point and is providing flow and thermal benefits of the cool 13 degrees C surface water to Whychus Creek all the way to the Deschutes River and then downward into Lake Billy Chinook. The TSID mitigation is

1.51 cfs of flow that is left in the creek for a portion of the irrigation season. In low flow years that may only be 90 days. In heavy flow years that may be 150 days or so. Depending on the flow in Whychus Creek, the actual volume of mitigation water from the rights being purchased by Thornburgh could be as high as 200-300 AF, instead of the 106 AF required to mitigate as determined by Yinger 2008. As noted above, the 106 AF need was determined by Yinger who modeled stream impacts using 2,355 AF of water at 100% consumptive use whereas Thornburgh's current plan reduces pumping to 1,460 AF and consumptive use to 882 AF. The TSID water was shown to mitigate for the full impact of 106 AF of stream reduction at Whychus Creek. As noted above, Thornburgh has completed the required arrangements and this TSID mitigation is presently in the creek.

Compliance with this FWMP regarding this certificate is completed.

3. Comply w/OWRD Mitigation Rules: Provide Mitigation Before Pumping:

Mitigation required for any groundwater permit that appropriates water from wells at the Thornburgh property, will be provided prior to pumping water under that permit, as required by OWRD rules. Mitigation, when or if needed, will be provided by either cancellation of water rights in lieu of mitigation, or transferring the existing surface water rights to instream rights. By providing mitigation water from the conversion or transfer of existing water rights, Thornburgh will be restoring natural stream or groundwater flows to the system at or above an area of impact from Thornburgh wells, much of which will occur during the time period when stream flows are typically the lowest and temperatures are warmest.

4. For Remaining Water Use BFR, COID, or Other Water Benefitting Deschutes or Crooked Rivers:

The water rights described in **Section II-2.** above will provide up to 1,217 AF of the resort's total water needs of 1,460 AF leaving at least 243 AF of additional water needed. For any additional water needed over and above the 1,217 AF, Thornburgh will use some combination of: i) BFR surface water (Deep Canyon or Makenzie Canyon); ii) BFR ground water; iii) COID mitigation water or credits; iv) Temporary credits such as the 6 AF from Deschutes River Conservancy ("DRC"), or v) other ground or surface water or credits that discharge water into either the Crooked River or Deschutes River or its tributaries and meet the requirements of the OWRD mitigation program.

Analysis by Cascade Geoengineering, LLC shows: i) using additional BFR water with groundwater points of appropriation will comply with the no net loss standard and have no impact to fish habitat; and ii) the transfer of other groundwater rights that discharge cool groundwater into area streams and rivers will provide thermal benefits to the rivers and streams; and iii) other surface water placed instream above areas of concern will provide thermal mass that will serve to cause cooling during the critical summertime period when stream temperatures are highest and flows the lowest.

5. **Provide 106 AF of Additional Whychus Creek Mitigation (TSID)**:

   Thornburgh will provide 106 AF of Three Sisters Irrigation District water for additional mitigation in Whychus Creek. This was required by Condition #39 of the FMP approval. Thornburgh has provided documentation evidencing the funding arrangements required, satisfying condition #39. TSID has completed the project and the water is permanently protected in Whychus Creek. This mitigation was previously proven to result in thermal and flow benefits from the TSID diversion above Sisters throughout Whychus Creek. With the extra water from Certificate 89259, flows are further increased, which is expected to lower temperatures further throughout Whychus Creek and in the Deschutes River onward to Lake Billy Chinook.

Collectively, the measures in **1.-5.** above will demonstrate Thornburgh Resort's continual compliance with Deschutes County's No Net Loss standard in DCC 18.113.070(D), specifically as it pertains to impacts to fisheries and aquatic habitat. The measures discussed in **6.-8.** below will provide excess mitigation that provide additional net benefits to the fisheries resources.

Section C:

6. **Leave Water Rights Instream or In the Aquifer Until Needed for Resort Uses:**

   Thornburgh intends to pump water only as needed. When not needed, it will allow water to flow in the stream, or leave it in the ground, providing advance benefits for impacts to occur at some point in the future. Advance or excess mitigation accumulates from providing mitigation prior to pumping but also during the transient period before impacts are fully realized in the stream. The CGE memo dated August 12, 2022, discusses the accumulation of excess mitigation. Table 5A of that memo shows that Thornburgh, between now and 2071, will provide "mitigation" benefits of 71,771 AF while reducing streamflow by 47,117 AF. This creates excess "mitigation" benefits of 24,674 AF (or more) or the equivalent of roughly 17 years of full pumping of 1,460 AF. Of that excess mitigation, more than 17,000 AF, or nearly 12 years of full pumping by the resort is provided from groundwater.

   During periods of severe water shortage, Thornburgh may work with OWRD as to request usage of excess mitigation water that may be used to benefit farmers in significantly impacted irrigation districts, including the North Unit Irrigation District that supports up to 58,000 acres of farmed land in Jefferson County. Thornburgh will request OWRD concurrence and permission from the County to periodically allow it to use its excess mitigation water to provide drought relief to farmers impacted by water shortages resulting from drought, the Habitat Conservation Plan, or other extraordinary circumstances causing water shortages for farmers. As discussed above, Thornburgh has applied to temporarily transfer 200 AF of water to the North Unit Irrigation District. Under this exception, until the water rights are pumped by Thornburgh or used as mitigation, Thornburgh would like to be allowed to offer free use of its water to farmers severely impacted. Thornburgh does not intend this as a business, rather it is envisioned as an act of goodwill and a benefit to actual farm uses

in the area. Further, any water excesses provided by Thornburgh is purely excess mitigation water that is not needed to mitigate for Thornburgh pumping. As such it will not have a negative impact on fisheries habitat although it could have a very positive impact on farmers. This temporary usage by others may be accomplished by temporary transfers on an annual basis when excess mitigation may be available.

7. **Thin Juniper Forests Onsite and On BLM Lands.**

Thornburgh is thinning substantial areas of Juniper forests both on site and on BLM managed lands. Juniper is a native species that, with an increase in European settlement in Oregon, has increase substantially throughout Oregon. With this increased human settlement, and the associated changes to the environment through agricultural and livestock grazing practices, Juniper is now often seen as invasive by means of a likely 10-fold increase in prevalence that has been shown to reduce water capture, retention, and recharge to the area surrounding these increased stands of Juniper. Studies show a strong correlation between Juniper removal and increased spring discharges with estimates that may be upwards of 1 acre-foot of increased discharge resulting from the removal 4-5 acres of Juniper forests. Over the last 100 years there has been large expansion in the acres covered by Juniper, which may be impacting water levels. Deschutes and Crook Counties are both looking at Juniper removal as a method to benefit water.

Deschutes County has received Federal funding for Juniper removal and is promoting residents to utilize the funding to remove Junipers. Crook County is looking at the construction and operation of a biomass plant to facility the removal of some of the 600,000 acres of Juniper increases since the 1930's. Over the same time, Crook County officials report an estimated reduction in water flow of 160,000 AF. Experts, such as Tim DeBoodt, Crook County Natural Resource Policy Coordinator, report that the reduction of between 4-5 acres of Juniper trees can save, or return 1 AF of water, ideally in the form of increased ground seepage that may result in increases in spring flow. Crook County hopes to reduce Juniper coverage and subsequently increase stream flows and return some of the 160,000 AF that has been lost from Crooker River flows.

Thornburgh, as part of its development and wildlife mitigation plans, will thin up to 5,000 acres of Juniper forests, returning the land to the condition of the historic old growth forest that was prevalent in the 1930's.

Section D:

Compliance: The purpose of this section is to clarify what constitutes compliance with this updated 2022 FWMP, whether during the review of Resort land use applications, as reported as part of annual monitoring, or for any other purpose. As noted above Thornburgh[3] owns 1,211 AF of water rights to be used for pumping or mitigation and

[3] Pinnacle Utilities, LLC an affiliated company is the Resort's water provider.

pumping at the point of diversion or appropriation of the certificate has been discontinued. For the reasons discussed herein compliance with this FWMP has been met for rights b-f and, will be met for the TSID water (g) in the manner discussed in this Section, 1b below. For any additional water rights that are acquired compliance will be met as described herein.

1. Compliance with this FWMP will occur differently for water appropriated from a surface water Point of Diversion (POD) versus a groundwater Point of Appropriation (POA) or for a mitigation credit as follows:
   a. POA – Groundwater: For any future rights that may be acquired, mitigation has been provide and compliance occurs upon; the cessation of pumping of the rights, along with; i) a deed evidencing the transfer of ownership, or, ii) an assignment of the water right to Thornburgh, or, iii) an approval of any of the following: (a) an application that seeks OWRD approval of a transfer to pump at the Resort property, or (b) a cancellation in-lieu of mitigation.
   b. POD – Surface Water: Once acquired, Compliance occurs upon the cessation of pumping at the source and submittal to OWRD, and OWRD issues a final order (or its equivalent) approving any of the following: (i) an application that transfers to pump at the Resort property, (ii) an application that transfers the water to an in-stream lease, (iii) the cancellation in-lieu of mitigation, or (iv) an application to transfer to obtain mitigation credits, permanent or temporary.
   c. Mitigation Credit: In the event that Thornburgh acquires mitigation credits, compliance occurs when Thornburgh provides proof of ownership or proof of submittal to OWRD to use the credits as mitigation.

Thornburgh also agrees to the following measures to provide mitigation benefits over and above the benefits achieved by the mandatory measures described above. Noncompliance with these measures shall not, however, be grounds for declining approval of a Resort development permit because these measures are not required to meet any Resort approval criterion, including the no net loss standard:

2. Thornburgh will discontinue the exempt use of all three exempt wells located on the Resort property (referred to as the Kem, Bennet and Price wells) prior to the completion of Phase A-1. Where required for development purposes any of these wells may be physically abandoned and sealed but that is not required for compliance with this FWMP.

3. Discontinue the use of all purchased water rights listed in Section B2 a-e above (Pg. 3-6) until they are used by the Resort as a transferred water right or as mitigation for pumping groundwater for Resort uses. The following exceptions apply: (1) purchased rights may be pumped if necessary to avoid forfeiture; and (2) purchased rights may be transferred for use by farmers, including those in the North Unit Irrigation District or other party if used for farm use purposes as defined by ORS 215.203 (whether in an exclusive farm use zone or otherwise), if OWRD authorizes a

temporary transfer to help address the needs of farmers. Currently, such transfers may be allowed by Executive Order of the Governor declaring a State of Drought Emergency.

4. The Resort has already committed in its FMP to remove and/or thin thousands of acres of Juniper trees from the Resort property and BLM lands to enhance wildlife habitat values. The thinning and removal of Juniper trees can have a dramatic reduction on the consumption of water, potentially saving hundreds of AF of water per year.

Reporting: In addition to any reporting required by OWRD pertaining to water use or mitigation, Thornburgh will provide annual reporting (no later than December 31st of each year) to Deschutes County, with a copy to ODFW's local field office, of the following information:

1. The status of each of the certificated water rights discussed in Section II-B2, including the status of any transfer or cancellation applications affecting any of those rights.
2. Copies of any annual reporting filed with OWRD.
3. An accounting of the total amount of water pumped under any of the water rights discussed in Section II-B (2) between November 1 – October 31 of the prior year.
4. An accounting of the total amount of a) groundwater left in ground, b) surface water left instream (permanent or temporary), or c) water held as mitigation credits (permanent or temporary) in accordance with this Section D, paragraphs a, b & c.
5. The accounting referred to in #'s 3 and 4 of this section will be maintained both annually, and on a cumulative basis.
6. An accounting of the amount and certificate # of any water provided to farmers for drought relief.
7. The amount and source of any OWRD mitigation used to mitigate for the pumping in #3 of this section.
8. Any change in the status of any of the three exempt wells including whether they have been abandoned to date.
9. Consistent with the 2008 FWMP, no additional reporting is required during the review of any land use application related to the Resort.

III. 2022 FWMP Results

Results of Section II-A: Item 1.

Thornburgh, after listening to the concerns of its neighbors as they pertain to water, has taken dramatic steps to reduce its water footprint. The main point of this 2022 FWMP, is that Thornburgh is voluntarily reducing it water usage from 2,129 AF annually to 1,460 AF annually, a reduction of more than 31%. This reduction reduces every impact that Thornburgh's water usage could create and is the driving principle behind this amended 2022 FWMP.

Results of Section II-B: Items 2-5.

Implementation of the elements of this FWMP described in **2.-5.** above and the related OWRD requirements as described herein are expected to result in replacement flow, or mitigation of more than the resorts consumptive use of 882 AF per year at full build-out and to fully mitigate for all impacts to the fisheries resource in accordance with the No Net Loss standard of DCC 18.113.070 (D). At least 1,323 AF (1,211 owned, 6 AF leased and at least 106 AF transferred instream) of this replacement or mitigation water is already owned or leased by Thornburgh, who has ceased pumping all of the water from its original place of appropriation. Where needed Thornburgh has already filed transfers to change the POAs, the PODs, and the places of use of the water rights presently owned. 1,123 AF of this water is already providing the FWMP mitigation called for in this FWMP in advance of pumping.

Thornburgh retained experts to complete and exhaustive analysis of the impacts to stream flow, along with the thermal impacts from Thornburgh's pumping on fisheries habitat and commissioned over 15 technical reports or memo's detailing that analysis. A summary of results includes

a. Provide a net increase in the discharge of cold ground water via seeps and springs stream flow in the Deschutes River from Crane Prairie reservoir downstream to Culver, including at two spring locations of concern to ODFW above and below the mouth of Whychus Creek,
b. Provide a net increase in the discharge of cold ground water via seeps and springs in Whychus Creek from Sisters to the mouth, including at important "ODFW" spring locations at Alder Springs and the mouth,
c. Add cold groundwater discharge versus the 2008 FWMP to the Crooked River, including in important "ODFW" spring areas near Osborne Canyon and Opal Springs,
d. Increase net flows in the Little Deschutes River from south of LaPine into the Deschutes River,
e. Increase net flows of the Deschutes River from the confluence with the Little Deschutes onto Lake Billy Chinook,
f. In most cases reduce net stream temperatures in the Deschutes River[4],
g. Increase net flows of Whychus Creek from Sisters to the mouth,
h. Reduce net stream temperatures of Whychus Creek as noted in "g" above,
i. Increase habitat quantity in the Little Deschutes River,
j. Increase habitat quantity and improve habitat quality in virtually all areas of Whychus Creek and the Deschutes River, and:
k. Reduce the thermal impacts in the Crooked River as compared to the 2008 FWMP to levels immeasurable, including in spring areas noted by ODFW, and not likely to cause a change in the quality or quantity of fish habitat.

[4] Thornburgh's 2008 mitigation measures estimated an increase in temperature change of 0.00 degrees C at Lower Bridge, 0.10 degrees C at Steelhead Falls, and 0.1 degrees C below the mouth of Whychus Creek. The hearing officer approved these increases which is DEQ's legal threshold for measurable change.

These elements a-k, above are based on steady state conditions, the point in the future when 100% of the impacts from Thornburgh pumping have been realized in the form of streamflow reductions which may not occur for decades into the future after Thornburgh's pumping begins. Measure C below discusses the excess or advance mitigation being provided to the fisheries resource.

Results of Section C: Items 6-7.

Excess Mitigation: The net results described in Section B above assume steady state conditions, the point in time when full pumping is occurring and the reductions in groundwater discharge into the streams are fully realized. As noted above and in the CGE memo, steady state conditions will not occur for as long as 95 years or more.[5] Until then, Thornburgh will provide substantial amounts of excess mitigation, likely resulting in un-required benefits during this timeframe. Assuming it will only take 50 years for steady state conditions to occur, Cascade has calculated that Thornburgh will discharge 71,771 AF of water into the system while creating impacts/withdrawals on the system of 47,117 AF, and excess benefit/discharges of 24,654 AF additional water over impacts in that transient than required. In sum the benefits provided are over 52% greater than the impacts created in the first 50 years of this 2022 FWMP, and equal nearly 17 years of full pumping of 1,460 AF. This situation will be most pronounced (nearly 100% excess) in the early years and gradually narrow as the difference between benefits and impacts narrows until steady state conditions are attained.

Juniper Thinning: As the resort is developed it will both clear and thin Junipers from the Thornburgh lands. It will also thin in conjunction with the BLM, approximately 3,400 acres of Junipers on BLM lands.[6] The benefits to the watershed from Juniper reductions can be substantial and there are concerted efforts to reduce human induced Juniper expansion that has occurred in many areas of the west, including Deschutes and Crook Counties. Many of these efforts are supported and financed by Federal funding. While it is difficult to quantify the exact benefit to the watershed in terms of increased stream flows, the reduction in Juniper coverage has been shown to be positive. When studies show the possibility to save up to 1 AF for every 4-5 acres of Juniper reduction, thinning thousands of acres could provide a significant benefit to nearby stream flows.

A technical report issued by Resource Specialists, Inc. dated January 31, 2023 estimated Thornburgh's removal and thinning of Juniper trees could save as much as 304 AF of water annually from when thinning occurred. See Exhibit B.

[5] The 2004 USGS model estimated impacts of 100% were reached in year 80 after full pumping is begun. It will take at least 15 years, and perhaps 20-25 years until Thornburgh is fully occupied and pumping at those levels.

[6] Thornburgh will thin roughly 3.5 acres of Junipers for every acre of land it develops on the Thornburgh site. At the time of the WMP Thornburgh estimated that about 900 acres would be developed.

Comparison of Thornburgh's 2008 FWMP vs. the 2022 FWMP.

All the OWRD mitigation in the prior FWMP was surface water flows benefitting only Whychus creek from Sister to the Deschutes River and the Deschutes River between Bend to Lake Billy Chinook. Of that mitigation water 0% was groundwater (coldest), while 62% (was 13 degrees C) Deep Canyon Creek water, with the remaining 38% being warmer, (26 degrees C) surface water from COID that provides little thermal benefits. The average temperature of the 2008 mitigation was 18 degrees C. By contrast, this 2022 FWMP is comprised of roughly 84% cold groundwater (11 degrees C), and 200 AF of LeBeau surface water (20.4 degrees C) for an average of 12.5 degrees C[7].

The current plan, like the 2008 FWMP, leaves cool water in the stream to mitigate for thermal impacts from the reductions of groundwater discharge into the river. The current plan, however, substantially increases the percentage of cool water mitigation from 62% to 84% and provides benefits into the affected streams, including Whychus and Deschutes included in the 2008 FWMP but also the Little Deschutes River, Indian Ford Creek, and the Crooked River that received no benefits in the prior FWMP.

In short, the current plan will increase summertime flows in the critical areas while at the same reducing average stream temperatures. Regardless of where the remaining 243+/- AF (1,460-1,217) of water rights or mitigation comes from this plan has already mitigated for the full impacts to seeps and springs.[8]

IV. Background and Baseline

The Thornburgh Resort (the "Resort" or "Thornburgh") will have no direct impact on natural surface waters; there are no such resources on the property and the proposed source of water for the Resort is ground water pumped from wells on the Resort property, to be appropriated under a series of water rights approved by the Oregon Water Resources Department ("OWRD"). Use of ground water by the Resort is expected to indirectly impact flows in the Deschutes River because of a determination of hydraulic connection between surface and ground waters in the Deschutes Basin. This determination was made by OWRD in connection with its evaluation and approval of Thornburgh's original water right authorizing the appropriation of 2,129 acre-feet of ground water for the Resort.

As a result of the determination of hydraulic connection, Thornburgh was required to provide mitigation to offset projected flow reductions in the "zone of impact" identified by OWRD, in this case the "General Zone" of impact, consistent with OWRD's Deschutes Basin Groundwater Mitigation Program.

[7] 206 AF of surface water including the 6 AF of DRC credits. Both plans have an additional 1.51 cfs (at least 106 AF) of cool 13 degree C TSID surface water.

[8] If all 249 AF of additional water was from a surface water source the resulting % of total mitigation comprised of groundwater would be 69.2%, still greater than the 0% of groundwater and 61.7% of cool Deep Canyon water in the 2008 FWMP.

Separate from this mitigation and, to meet Deschutes County's own No Net Loss standard found at DCC 18.133.070(D), Thornburgh voluntarily agreed to address both flow and water temperature concerns, which was to serve as a component of the mitigation measures for the original FWMP. Those measures are set out in Section V. Mitigation and Enhancement Measures of the FWMP. These and other measures added to the 2008 FWMP during the review of the Final Master Plan ("FMP") were determined to fully mitigate for any negative impacts on habitat and to achieve compliance with DCC 18.113.070(D).[9]

The core component of the 2008 FWMP was adding cooler water to the river upstream of areas that were important for fish habitat. Thornburgh identified Deep Canyon Creek as a source of this cooler water, which had a temperature of approximately 13 degrees C. This water, however, has historically been pumped directly from the creek for irrigation purposes before it reached the Deschutes River. Thornburgh committed to purchasing these water rights and placing them in stream to improve flows and to cool the river.

In 2008, the use of this cool water made up just 62% of the total mitigation promised by the FWMP, but was found sufficient to fully mitigate for 100% of the thermal impacts to the Deschutes River (and to Whychus Creek as well according to Oregon Department of Fish and Wildlife ("ODFW")) attributable to Thornburgh's pumping. Additional impacts of 1.87 cfs[10] to seeps and springs were identified in the 2008 FWMP, which planned mitigation by leaving 1.97 cfs (equal to 105% of the impacts) of the Deep Canyon water in the river upstream of areas identified as critical fish habitat. Additionally, this mitigation was determined by the ODFW to result in a net benefit to fisheries.

Project opponents objected to the 2008 FWMP, claiming that no mitigation was provided to address a slight reduction in groundwater recharge to Lower Whychus Creek. Although Thornburgh and ODFW disagreed that mitigation was needed in this location, Thornburgh volunteered to provide additional mitigation specifically for Whychus Creek by funding a part of a Three Sisters Irrigation District project. The County's hearing officer accepted this offer. The Whychus Creek mitigation was opposed by a project opponent but proven to meet the No Net Loss standard and to provide additional benefits to habitat resources in Whychus Creek. This mitigation project has been completed.

[9] This is a Deschutes County standard only.
[10] The 1.87 cfs of impact was the total amount of impact to all seeps and springs in any location (Deschutes, Whychus, etc.) from Thornburgh pumping 2,129 AF of groundwater.

V. Resort Water Supply and OWRD Mitigation

A. Resort Water Needs and Supply

Thornburgh's water supply is groundwater from the General Zone of the Deschutes Basin Regional Aquifer and is pumped from numerous wells located within the Resort boundaries. This has not changed since the Resort was first approved in 2006. The original plan anticipated 6 groundwater wells would be installed. Presently, there are 8 potential groundwater wells. However, changes to Resort infrastructure may require additional well locations to be added or moved. As was noted from David Newton in a memo dated August 24, 2021, (Exhibit C) the number or specific location of wells within the resort property has no bearing on the mitigation plan or the efficacy of mitigation to offset pumped groundwater from the Resort's property. Any well within the resort property will pump from the same regional aquifer to supply Thornburgh water for a variety of purposes, common among municipal and resort style communities in Central Oregon. Thornburgh uses to be served include domestic and commercial uses, golf course, park and landscape irrigation, reservoir/pond maintenance and fire protection. Collectively, these uses are defined by the OWRD as "quasi-municipal" uses. In 2008, the Resort's water needs at full build out were estimated at 2,129 AF per year, having consumptive use of 1,356 AF, and a maximum withdrawal rate of 9.28 cfs as shown below. As defined by OAR 690-505-0605(2), "*"Consumptive use" means the Department's determination of the amount of a ground water appropriation that does not return to surface water flows in the Deschutes Basin due to transpiration, evaporation or movement to another basin.*"

1. Original Water Use Full Resort Build-Out

WATER USE	ANNUAL VOLUME	CONSUMPTIVE USE
Golf Courses	717 AF	645 AF
Irrigation	195 AF	117 AF
Reservoir Maint	246 AF	206 AF
Other Q/M	971 AF	388 AF
TOTALS 9.28 CFS.	**2,129 AF**	**1,356 AF**

Since the approval of the 2008 FWMP, issues regarding the use and conservation of water have become increasingly important to the region. As a result of this growing regional water awareness, Thornburgh has taken focused steps to reduce the Resort's water usage by roughly **one third**. This reduction of water use will be achieved by Thornburgh foregoing its right to develop some water intensive amenities and reducing irrigated landscaping for resort facilities and individual homes. The Resort will also implement the use of improvements in the type and method of fixtures used in Resort buildings. As a result of this Thornburgh is reducing its total water needs from 2,129 AF to 1,460 AF as shown in table 2 below.

The source of Thornburgh water remains groundwater from the regional aquifer to be supplied via groundwater wells located on the Thornburgh property. All the wells Thornburgh will pump from are within the boundaries of the Resort and are pumping from the same regional aquifer,

the Deschutes Formation Aquifer. The location of wells within the resort has no change to the potential effects of groundwater pumping.

2. Reduced Water Use at Full Resort Build-Out

WATER USE	ANNUAL VOLUME	CONSUMPTIVE USE
Golf Courses	501 AF	451 AF
Irrigation	111 AF	66 AF
Reservoir Maint	51 AF	43 AF
Other Q/M	797 AF	319 AF
TOTALS	**1,460 AF**	**882 AF**

3. OWRD Alternates to Transferring Thornburgh's Water Rights.

Thornburgh has numerous applications, permits and other certificated water rights, as listed below for use as part of the Resort's water plans that may be used for consumptive water or mitigation water purposes. In addition to transferring certificated water rights to the Thornburgh property, alternatively, they can be used to mitigate for pumping of groundwater reported under any groundwater permits, or Limited License. OWRD mitigation must be in the form of legally protected water for instream use which can be accomplished in different ways acceptable to OWRD, including: i) transferring existing surface water rights for irrigation use into protected instream use; and ii) voluntary cancellation of either surface or groundwater permits in lieu of mitigation. Each method results in the full amount of pumped water allowed under the certificate to be protected permanently instream. OAR Chapter 690, Division 505 (the Deschutes Basin Groundwater Mitigation Program). Thornburgh can use a surface water certificate either way but can only cancel groundwater certificates "in-lieu" to create OWRD mitigation. Regardless of the methodology for meeting the mitigation obligation, the result is similar: the authority to pump water in one location ceases and allows water to be pumped from wells at the Thornburgh property. Mitigation is discussed in detail below.

Using the certificated rights for mitigation by either cancelling the right in-lieu or transferring it instream provides at least equal benefits to streamflow and temperature as transferring the water to the Thornburgh property. Either method of providing OWRD mitigation will provide sufficient benefits to fish habitat such that there is no net loss or degradation of the resource.

4. Groundwater Permits, GW, and LL Applications:

a. Ground Water Permit G-17036 – This permit authorizes up to 9.2 cfs and 2,129 AF for Quasi-Municipal uses including irrigation of golf courses, homes and commercial areas, and maintenance of reservoirs. Period of use is Year-Round except for the seasonal limits placed on irrigation use by the permit. The rate and volume are further limited by the corresponding mitigation provided. The maximum volume for irrigation of 320 acres of golf courses shall not exceed 717 AF annually. The amount of golf course irrigation specifically under this right is limited to a diversion of 2.24 AF for each acre irrigated during the irrigation season of each year. The amount of water allowed to be used for

reservoirs under this permit is 246 AF. The fully developed Mitigation Obligation for this right is 1,356 AF annually, to be provided within the General Zone of Impact. Mitigation is to be provided prior to each stage of development under the permit.

In 2013, Thornburgh posted 3.6 acre-feet of mitigation credits as the initial mitigation and the permit was issued. Due to unforeseen delays, Thornburgh was required to apply for an extension of the permit, which was granted in 2018 with OWRD issuing a Proposed Final Order and Final Order granting approval. Ms. Gould subsequently filed suit against OWRD at the Oregon Court of Appeals. OWRD withdrew its final order and sent the approval (as noted in the Proposed Final Order (PFO)) to a contested case hearing. On July 26, 2022, OWRD issued a superseding proposed final order proposing denial of the extension, but the permit remains non-cancelled (valid) as of the date of this 2022 FWMP. Thornburgh has protested this PFO and is seeking a contested case hearing.

Permit G-17036 is the first permit Thornburgh acquired. Due to litigation opposing the permit and the lengthy delays involved at OWRD, Thornburgh developed alternatives to pump groundwater from the Resort's wells with little reliance on this or other OWRD groundwater and limited license permits, or applications as described below.

b. Ground Water Permit Application G-19139 (pending) – This permit application was for the use of 9.28 cfs of year-round Quasi-Municipal water having the same limitations and mitigation requirements as permit G-17036. It was filed at the suggestion of OWRD staff as a potential replacement to permit G-17036 pending the contested case by Ms. Gould. The POA of this application is 8 wells located on the Thornburgh property. The application is pending. If not approved, Thornburgh will file a petition for judicial review.

c. Limited License Application LL-1879 -- This limited license application was for the use of 4.5 cfs of year-round water. The application was filed to provide preliminary use of some of the water permitted by G-17036 pending the resolution of the contested case on the extension. OWRD denied the application, and Pinnacle has filed a petition for judicial review in Deschutes County Circuit Court. If the limited license is approved, this will require mitigation for the life of the limited license, which can be done more informally than is required for permanent permits or certificates.

d. **Limited License Application LL-1917 (pending)** – This limited license application was for the use of 0.453 cfs of year-round water. The amount requested is the same amount of water as will be transferred under the authority of T-13703. It was filed as an alternative to the use of the water in T-13703, as a challenge to the transfer is reviewed by the court system. The application is pending. If approved, this will require mitigation for the life of the limited license, which can be done more informally than required for permanent permits or certificates.

The source of water pumped from groundwater wells located at Thornburgh is the regional aquifer residing under the Resort and throughout much of Central Oregon. The source and method of supply—or the impacts generated from withdrawal of water—does not change based

upon which permit, or certificate(s) Thornburgh reports its groundwater pumping under (i.e., a transferred right, permit G-17036, or an alternate permit or certificate). OWRD rules and regulations govern the withdrawal of water from the aquifer regardless of permit or certificate number, and the impacts to that aquifer are the same regardless of the legal mechanism for withdrawal of the resource.

B. OWRD Mitigation Requirements for New Groundwater Permits

Mitigation is required for new ground water permits in the Deschutes Basin under ORS 390.835 and related administrative rules in OAR 690-505-0500 *et seq.* This does not apply to certificated water rights that have been fully developed and need no further mitigation. The OWRD mitigation rules were adopted in response to a comprehensive study of ground water resources in the Deschutes Basin conducted by the United States Geological Survey ("USGS") and OWRD. (*Ground Water Hydrology of the Upper Deschutes Basin, Oregon,"* USGS Water Resources Investigation Report 00-4162, 2001.) The study demonstrates hydraulic connection between the regional groundwater aquifer and surface water within the Deschutes Ground Water Study Area as shown on Figure 1.

Under OWRD rules, all new ground water uses within the USGS study area are presumed to be in hydraulic connection with the Deschutes River system. The rules require mitigation to offset the impact of ground water pumping on surface water flows. In reviewing applications for new ground water rights, OWRD determines the total quantity of water to be diverted from groundwater and the amount of "consumptive use" associated with the proposed new use. The amount of mitigation required – or "mitigation obligation" – is equal to the annual amount of consumptive use.

In addition to specifying the quantity of mitigation water required to offset consumptive use, OWRD identifies the "zone of impact" or location within the surface water system in which the impact of a proposed ground water use is expected to occur. Mitigation for any new groundwater permit used by Thornburgh is required in the "General Zone of Impact" which allows mitigation water to be obtained from any source in the Deschutes Basin above the Madras gage, located below Lake Billy Chinook. The broad geographic scope of the General Zone reflects findings in the USGS Study that most ground water within the basin flows toward the confluence area of the Crooked and Deschutes Rivers and discharges into the river and tributaries in an area just above Lake Billy Chinook.

Initially, OWRD determined the consumptive use, and mitigation obligation of permit G-17036 to be 851.6 AF (40%, of 2,129 AF). Water Watch protested that determination and Thornburgh voluntarily agreed to increase the consumptive use of individual elements of the permit which raised the overall mitigation requirement to 1,356 AF. The application for the replacement permit, permit application G-19139 uses the same consumptive use rates applied by OWRD because of the settlement. Under OWRD rules, mitigation for new groundwater permits must be provided in advance for the full amount of water to be pumped under the new permit for each phase of development.

C. Thornburgh OWRD Mitigation Plan

Applicants proposing municipal or quasi-municipal water use have the option of providing mitigation in incremental units tied to specified phases of development; however, the mitigation obligation for each phase of development must be provided in full before water use may begin for that phase. Thornburgh submitted several versions of its "Incremental Mitigation Plan" ("**IMP**") to OWRD as allowed by OWRD rules. Changes to the IMP may occur in the future without need for amending this plan. The IMP describes the proposed timing for meeting the mitigation obligation for Permit G-17036, developing the 2,129 AF of water uses and mitigation over several phases extending out to 2035.

Because of extensive and protracted litigation and challenges to land use and water permit and transfer applications and the delays in processing the contested case on the extension of the permit, Thornburgh developed extensive additional water resources as noted in Section B above, that can be used to comply with the No Net Loss standard. Thornburgh completed funding for the TSID mitigation that has been determined to fully mitigate for groundwater reductions projected to occur to Whychus Creek based on the water use studied by Mark Yinger that overstated the water use of the Resort. This mitigation has already been provided by TSID and is described in B.6. above.

At this point it is unclear how much water will be pumped from G-17036 or any alternate "NEW" groundwater or limited license permit.[11] What is clear, however, is that the Resort has agreed to reduce its water use from 2,129 AF with a consumptive use of 1,356 AF to 1,460 AF with a consumptive use of approximately 882[12] AF. More importantly, this FWMP has accounted for the maximum amount of pumping that could occur of 1,460 AF and is providing mitigation that meets or exceeds the no net loss standard. Thornburgh will be required to provide mitigation for this amount of water when due, which is before pumping consumptive water for an approved resort use. Thornburgh's maximum water use is capped to 1,460 AF, which is less than 1/100th of 1% of all current water use (approximately 750,000 AF) in the Deschutes Basin.

The certificated, fully mitigated water rights above, except for the Dutch Pacific water rights, have been or are being transferred to the Thornburgh wells. The transfers will change the place of appropriation and use. The first of these, Transfer T-13703, was approved transferring 327.5 AF of quasi-municipal water from a well in west Bend to the Thornburgh wells. The total amount of the planned transfers, including T-13703, if approved, is 1,161 AF. In the alternative the 1,161 AF of certificated water rights could be cancelled (both the groundwater and surface water rights) or transferred instream (just the surface water rights) for mitigation credits. All this water would comply with the OWRD mitigation rules if used in that manner.[13] Certificate 89259 (2. E. above) for 49.5 AF is being cancelled in lieu of mitigation. When all the transfers or cancellations are

[11] It is unnecessary to determine this at this time as the source of water must remain the same, the Deschutes Regional aquifer. DCC 18.113.070(K). However, the mitigation for impacts to habitat based upon withdrawal from that source are the subject of this document.

[12] Applying OWRD standard practice of 40% to QM permits would result in consumptive use of 584 AF. This plan provides mitigation far more than that amount.

[13] As the basic premise of the mitigation program was to halt expansion of water use in the Deschutes basin, it cannot allow for expansion of use and must instead be permanently instream.

done, Thornburgh will need to obtain a relatively small amount of additional water rights to transfer to its property or to use as mitigation. Because of the efficacy of the present plans, most critically is the fact that the 1,217 AF[14] already mitigates for 119% (w/out the TSID or 198% with it) of the impacts to springs and seeps[15], and that the source of remaining water coming from within the General Zone of Impact will not create an adverse impact on the fisheries habitat.

Of the certificated water rights described above, Thornburgh owns 1,211 AF[16] that at the time of this report it is not pumping. 200 AF of that is surface water that is not being pumped from the river south of LaPine while 1,011 AF remains in the aquifer to flow to the streams, including the Deschutes River, Whychus Creek, and the Crooked River to increase flows and provide thermal benefits, long before the resort creates any impacts on the stream. This "advance" or "excess mitigation" accumulates for years until the impacts are fully felt in the stream. As is discussed in more detail below this excess mitigation accumulates to a substantial amount.[17]

D. Groundwater Withdrawals and Quality Mitigation

In other resort approvals, OWRD mitigation only[18] was accepted as providing the entire mitigation needed to meet this standard for fish habitat. In the case of Thornburgh Resort, this standard has been redefined to require "water quality" mitigation. This was required despite the fact that all groundwater pumping in the Deschutes Basin affects groundwater discharges which impact stream flows. OWRD mitigation, by design, increases streamflow by either increasing groundwater discharge into the stream (groundwater mitigation) or by leaving water in the stream (surface water mitigation) which typically has the benefit of reducing river and creek temperatures.

Increasing streamflow is the main purpose of the OWRD mitigation program. It is also a primary purpose of many of the basin's environmental actions and restoration programs. NCI noted this in the 2015-2017 remand of the FMP relating to TSID mitigation for Whychus Creek. Flow volumes in the upper Deschutes River are an important component of the current Habitat Conservation Plan for the Oregon Spotted Frog. Flow volume guarantees set to protect the frog have created substantial impacts on the operation of the basin's irrigation districts and a tremendous burden on some of farmers within the basin, including North Unit Irrigation District.

Opponents of Thornburgh have typically focused on groundwater as it relates to its ability to affect streamflow, particularly the thermal conditions or "quality" of the remaining flow resulting from groundwater pumping. More specifically, opponents have focused on the location of the impacts to the area below Lower Bridge on the Deschutes River and lower Whychus Creek.

[14] Including the DRC credit.
[15] This is regardless of how the water is used. The analysis of the ratio of cool water mitigation is provided below.
[16] The 937 AF currently left instream presently does not include the 106 AF of TSID water in Whychus Creek currently flowing from the TSID diversion to the mouth of the creek and into the Deschutes River.
[17] Thornburgh may allow farmers affected by the Habitat Conservation Plan and/or drought conditions to use some portion of water it doesn't currently need to authorize pumping on a temporary basis. When providing water for farm drought relief, that portion of Thornburgh's water will not be instream.
[18] Meaning standard mitigation credits issued in conjunction with the Deschutes Groundwater Mitigation program.

However, these areas are where discharge of significant amounts of cold groundwater discharge into the Deschutes River, Crooked River and Whychus Creek, dramatically lowering stream temperatures and resulting in improved water quality.

In the original FWMP, groundwater withdrawals were mitigated for by providing surface water in the Deschutes River and its Deep Canyon Creek and Whychus Creek tributaries. In the case of the Deep Canyon Creek mitigation, surface water mitigation was justified in the 2008 FWMP because the creek itself is spring fed. While it is true that this water is cool, the surface water is heated (from approximately 11 degrees to 13 degrees) as it flows down the creek prior to discharge into the Deschutes River. In 2008, Tetra Tech's Mass Balance Analysis[19] reported minor thermal impacts (temperature increases) may occur in the Deschutes River. With Thornburgh's 2008 mitigation measures, Tetra Tech's analysis estimated a temperature change of 0.00 degrees. C at Lower Bridge, 0.10 degrees C at Steelhead Falls, and 0.1 degrees C below the mouth of Whychus Creek. Even though there was an 0.1 degree C increase in temperature (impact) in the critical fish habitat at Steelhead Falls and below Whychus Creek, the mitigation plan was approved as meeting the No Net Loss standard.

In the case of Whychus Creek, project opponents argued that slight groundwater withdrawals that occurred in both the upper and lower parts of the Creek impacted lower Whychus Creek. Opponents claimed it to be an area of critical fish habitat because it receives substantial cold groundwater discharges from the regional aquifer. The 2008 hearings officer expressed concerns about the creek during the peak summertime temperatures. While Thornburgh disagreed that mitigation was needed for Whychus Creek, it offered a solution to increase flows with the use of surface water. The solution was to leave 106 AF of cool mountain water in the creek from a point south of Sisters that would otherwise be pumped by TSID. The use of this TSID mitigation was challenged by a single project opponent. It was, however, approved because it was shown to achieve compliance with the No Net Loss standard based on an analysis of the impact of TSID mitigation water on temperatures in lower Whychus Creek. This mitigation also provides substantial additional thermal benefits to the middle and upper parts of the creek that were not even considered to meet the standard due to the limited scope of the review on remand. The NCI memo from October 2017 shows the maximum thermal impacts to lower Whychus Creek without mitigation, during the peak summertime temperatures and the creek at its lowest flow, to be 0.0042 degrees C. This 4/1,000^{ths} of a degree is far less than what can be measured using technology available today. **With** the TSID surface water mitigation, the temperature was ***lowered*** in Whychus Creek (lowered by approximately 0.001 or 1/1,000th of a degree, again in an amount too small to be measured)[20]. Three Sisters Irrigation District has completed the project, and Thornburgh has fulfilled its agreement to provide this the water which is now instream.

While Yinger 2008 noted roughly 13% of the flow reduction impacts would be felt in the Crooked River, neither Yinger nor ODFW voiced concerns about thermal impacts there. This may be

[19] Tetra Tech overstated impacts by allocating 100% of the impacts of 1,356 AF consumption into the Deschutes River which was not accurate. Yinger 2008 report stated lower % impacts, and when corrected the result is lower thermal impact.

[20] Since the amounts cannot be measured, they cannot be verified and are simply theoretical. As such, whether positive or negative they are considered as no change.

because of the large groundwater discharges in the area and the fact that the temperatures of the groundwater discharging into the Crooked River at Opal Springs and Osborne are warmer (between 11.6 and 13.7 degrees C[21]) than the discharges noted into the Deschutes or Whychus (around 11 degrees C). ***See* Exhibit 6, OWRD Spring Temp**. Still, to better understand any thermal impacts to the Crooked River from Thornburgh pumping, Newton undertook mass balance analysis of the 2008 mitigation plans comparing that to the current 2022 plans.

In the CGE memo dated August 12, 2022, impacts to the Crooked River were analyzed based on the Yinger 2008 report using both the 2008 FWMP mitigation and Thornburgh's current plans. Both scenarios used the OWRD temp data, Yinger 2008 impacts, and recorded flows at Opal Springs and Osborne. The 2008 FWMP had no Crooked River mitigation. All mitigation was Deschutes River and Whychus Creek surface water mitigation. The 2008 plan resulted in very slight temperature increases of between 0.0001 to 0.0017 degrees C. The 2022 plan used the same inputs but included mitigation that came from the cessation of pumping BFR groundwater, some of which impacts the Crooked River. As a result, the 2022 plan results in even smaller temperature increases, ranging from between 0.0000 to 0.0004 degrees C. Although the 2008 FWMP allows more than 4 times the thermal impacts of this 2022 Plan, the thermal impacts range from between ZERO to 4/10,000^{ths} of a degree C. None of these amounts can be measured and as such are considered as no change scientifically. They have been described as having no impact on fish habitat[22]. Subsequent analysis was done by Four Peaks and Newton to detail the impacts on the Crooked River. The resulting thermal impacts are 0.00 degrees C at both Opal Springs and Osborne Canyon. In both cases, the resulting benefits are too small to physically measure.

E. Fish Habitat Potentially Affected by Ground Water Use

During the consultation process in 2008, ODFW identified two specific concerns with respect to potential impacts of ground water pumping on fish habitat: First, the potential for flow reduction due to hydraulic connection that could impact flows necessary for fish and wildlife resources in the Deschutes River system; and second, the potential for an increase in water temperature as a result of flow reductions from ground water pumping. In preparation for this 2022 FWMP Thornburgh discussed the changes with ODFW to understand what areas would currently be of concern. While the area from Lower Bridge to Lake Billy Chinook on the Deschutes is still important, other areas were also of concern. This included flow limitations on the Deschutes River from Bend to Lower Bridge, on Whychus Creek from Camp Polk Road upstream to Sisters, and in Indian Ford Creek, that empties into Whychus Creek. This plan takes those areas into account.

In the 2008 process, ODFW identified six species of fish that could potentially be impacted: Redband Trout, Bull Trout, Brown Trout, Mountain Whitefish, Summer Steelhead and Spring Chinook. While relevant to consider, more important is the habitat itself. In *Gould v. Deschutes County*, 233 Or App 623, 227 P3d 758 (2010) the Oregon Court of Appeals found that the no net loss standard refers to habitat, stating:

[21] As recorded by OWRD staff and noted in Exhibit 6.
[22] Tetra Tech in their 2017 report, page 8, cited the EPA 2003 report which noted that temperature changes less than 0.25 degrees C were of no consequence to fish.

> "Thus, the context of DCC 18.113.070(D) strongly suggests that "fish and wildlife resources" refers not to species of fish and wildlife, but to the habitat that supports fish and wildlife. In light of that context, we conclude that DCC 18.113.070(D) allows a focus on fish and wildlife habitat to establish that "[a]ny negative impact on fish and wildlife resources will be completely mitigated so that there is no net loss or net degradation of the resource." That standard may be satisfied by a plan that will completely mitigate any negative impact on the habitat that supports fish and wildlife, without showing that each individual species will be maintained or replaced on a one-to-one basis."

In its consultation with Thornburgh regarding these issues, ODFW recognized that the OWRD groundwater mitigation program was specifically designed to identify and mitigate for the impacts of flow reduction because of new groundwater pumping in the basin. Although the OWRD rules and USGS study on which the rules are based do not directly address temperature issues, ODFW also recognized that with the flow replacement required under OWRD rules the potential impact to temperature because of the Thornburgh project – or any similar individual project – is expected to be negligible. However, ODFW expressed a concern about the potential for cumulative impacts from on-going groundwater development in the basin, over time. Although cumulative impacts may be a concern, Thornburgh does not need to mitigate for the impacts of others in order to achieve compliance with the No Net Loss/Degradation standard. That standard is based solely on impacts created by Thornburgh's pumping which were acknowledged to be negligible in 2008.

In early correspondence on this issue, ODFW identified concerns about potential impacts on cold water springs and seeps in the Whychus Creek sub-basin because of Thornburgh's groundwater use. Following consultations with OWRD staff and the Department of Environmental Quality and their own internal review, ODFW determined the type of habitat potentially affected by the Resort in Whychus Creek would be classified, for purposes of commenting on the Resort's FMP application, as Habitat Category 2. This conclusion was based on ODFW's determination that temperature impacts to stream flow, if present, can be mitigated with appropriate actions. As used in the ODFW Mitigation Policy, "Habitat Category 2" describes essential habitat for a fish or wildlife species. Mitigation goals for this category of habitat, standards that do not apply to the County's review of the FWMP, are no net loss of either habitat quantity or quality and to provide a **net benefit** of habitat quantity or quality. OAR 635-415-0025(2). ODFW reviewed the 2008 FWMP and determined that it would, without placing TSID mitigation water in Whychus Creek, offer a net benefit for fish habitat. Nonetheless, TSID mitigation water was required by the County's hearings officer. This led to legal challenges from Annunziata Gould who claimed the mitigation water was "hot water" that would harm fish habitat in lower Whychus Creek. Ms. Gould also argued on appeal of the FMP and 2008 FWMP, without success, that temperature impacts (of .1 degree C) to the Deschutes River violated the no net loss standard.

As a result of the Gould challenges, NCI undertook extensive mass balance analysis in 2015-2017 of the impacts on Whychus Creek *without* mitigation that showed maximum thermal impacts of 0.004 degrees C in Whychus Creek under the peak summertime temperatures and the lowest summertime flows. It also provided an analysis of the TSID mitigation. The analysis showed that keeping water instream in upper Whychus Creek offsets the thermal impact of groundwater

pumping by the resort and slightly reduces the temperature of water in lower Whychus Creek, more than 15 miles downstream[23]. The NCI studies resulted in affirmance of the FWMP because it demonstrated compliance with the no net loss standard.

The principle illustrated by the results of the 2015-2017 studies – that increasing the flow of rivers and streams upstream by not diverting for irrigation use both increases volume and lowers temperatures downstream – is also adopted in this 2022 FWMP. From the point that surface water withdrawals cease and aren't being pumped from surface water and from the point where previously pumped groundwater no longer being pumped is discharged into rivers and streams, increasing flows reduce thermal impacts, which in turn lowers stream temperatures from that point of discharge on downstream.

VII. CONCLUSION

DCC 18.113.070.D requires that any negative impact on fish and wildlife resources be completely mitigated so that there is no net loss or net degradation of the resource. This Addendum to the Thornburgh Wildlife Mitigation Plan, referred to as the 2022 FWMP, amends the 2008 FWMP (as it was updated) and addresses potential impacts to fishery resources because of ground water pumping and identifies specific mitigation measures. The potential for loss of habitat due to reduced surface water flows was quantified in connection with the OWRD review of Thornburgh's application for a water right permit. Under OWRD rules, Thornburgh is required to fully mitigate for consumptive use associated with Resort development. Consumptive use represents the amount of water not otherwise returned to the Deschutes River system after initial appropriation or diversion. The OWRD mitigation program is based on estimates of impact and modeling, the program is specifically intended to replace stream flows lost due to groundwater use.

The 2008 FWMP was developed in consultation with ODFW to address two specific areas of concern regarding the potential for negative impacts: the potential for a loss of habitat due to reduced surface water flows in the impacted areas, and the potential for loss of habitat due to increased temperature from reduced stream flow or loss of inflow from springs. As part of the development of this plan, discussions with ODFW took place to understand the current priorities to ODFW to protect species and related habitat. While the area of the Deschutes River from Lower Bridge to Lake Billy Chinook remained important to ODFW, other issues presented concerns to the agency. ODFW expressed concern with limited flows of the Deschutes River between Bend and the Lower Bridge area, and of Whychus Creek between Sisters and Camp Polk Road and in Indian Ford Creek. Also important to ODFW was the distance in the stream the mitigation change will improve, as longer stream reaches are better.

As described above this 2022 FWMP has numerous sources providing benefits and mitigation, several that provide benefits over a significant distance, including areas of concern to ODFW. For example: 1) the LeBeau water increases flow in the Deschutes River for 137.7 miles; 2) The Tree Farm water is cold groundwater discharges that increase flows in the Deschutes River from Bend downstream through the stretch of concern to ODFW and onto the lake; 3) The Dutch Pacific

[23] The TSID mitigation reduced temperatures slightly throughout Whychus Creek starting from the TSID diversion where the water was left in stream.

water is benefitting Indian Ford Creek and Whychus Creek around Sisters to the mouth; 4) TSID water adds cool surface water above Sisters to the mouth of Whychus Creek at the Deschutes River. All of these sources increase flows that add to the thermal mass which in turn reduces temperatures in their respective stream and river reaches, ultimately providing benefits down to Lake Billy Chinook.

The potential for an increase in stream temperature resulting in a negative impact to fish and wildlife resources was also evaluated. Regarding Whychus Creek, the TSID water was shown to fully mitigate any potential peak temperature impact and lower the stream temperatures in not only Lower Whychus Creek, but throughout Whychus Creek to the mouth, which includes the area of concern to ODFW. Increasing the groundwater discharges from the Dutch Pacific water will further increase the reduction in temperature and the thermal benefits being provided to Whychus Creek.

Regarding the Deschutes River, the 2008 FWMP increased flows between Bend and Lake Billy Chinook by adding warmer surface water in Bend and cooler surface water from Lower Bridge to Lake Billy Chinook. These additions resulted in temperature change of 0 degrees C above Lower Bridge down towards Steelhead Falls, and an increase in the temperature of 0.1 degrees C at Steelhead Falls to below Whychus Creek. Even with those slight increases in temperature providing cool water mitigation equal to 105% of the impacts to seeps and springs fully mitigated for any reduction in groundwater. Increasing the percentage of benefits to seeps and springs coming from cool water sources (includes groundwater, Deep Canyon Water, TSID water) to 195% presently from 155% in the 2008 FWMP naturally provides far greater benefits than previously approved.

In developing recommendations for this plan, it was clear any potential change in stream temperature attributable to Thornburgh's proposed ground water use under steady state conditions, whether positive or negative, would be at levels not measurable with available equipment and technology. Although the changes being discussed will, in almost all cases, result in an increase in stream flows and a reduction in stream temperatures, they are not significant enough to result in any quantifiable negative impact to fish habitat at any time. However, the massive influx of excess flows provided during the transient period will further increase stream flows and further lower temperatures in all the affected reaches for decades into the future as the actual impacts to stream flows gradually increase from Thornburgh's groundwater pumping until steady state conditions are attained.

By committing to fully utilize the water sources as described herein, and to comply with the conditions of this 2022 FWMP, any potential negative impacts to fish habitat resources because of the Thornburgh Resort development will be completely mitigated such that there is no net loss or degradation of habitat quantity or quality. In fact, it will likely provide a slight net benefit when steady state conditions are achieved many decades from now. During the transient period, Thornburgh will provide significant additional benefits to the quantity and quality of fish and aquatic habitat. As such this 2022 FWMP will exceed the no net loss/degradation standard set by DCC 18.113.070(D).