BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF THE CORONA WIND COMPANIES' JOINT APPLICATION FOR THE LOCATION OF THE CORONA WIND PROJECTS AND THE CORONA GEN-TIE SYSTEM IN LINCOLN, TORRANCE AND GUADALUPE COUNTIES PURSUANT TO THE PUBLIC UTILITY ACT, NMSA 1978, §62-9-3	)	**Case No. 18-_____**
ANCHO WIND LLC, COWBOY MESA LLC, DURAN MESA LLC, RED CLOUD WIND LLC, TECOLOTE WIND LLC, VIENTO LOCO LLC,	)	
JOINT APPLICANTS.	)	

DIRECT TESTIMONY OF

CHRISTOPHER J. KNOPP

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DIRECT TESTIMONY OF

CHRISTOPHER J. KNOPP

ON BEHALF OF THE CORONA WIND COMPANIES

Case No. 18 - _____ - UT
Before the New Mexico Public Regulation Commission of New Mexico
Direct Testimony of Christopher J. Knopp
on Behalf of the Corona Wind Companies

I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Christopher J. Knopp. My business address is 4225 Executive Way, Suite 500, La Jolla, CA 92024.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by Burns & McDonnell Engineering Company, Inc. ("Burns & McDonnell"). I hold the position of Senior Project Manager within Environmental Services.

Q. ON WHOSE BEHALF ARE YOU APPEARING IN THIS PROCEEDING?

A. On behalf of the Ancho Wind LLC, Cowboy Mesa LLC, Duran Mesa LLC, Red Cloud Wind LLC, Tecolote Wind LLC, and Viento Loco LLC (collectively, the "Corona Wind Companies" or "Joint Applicants") regarding the proposed 2200 megawatt of wind generation of the Joint Applicants' wind energy facilities ("Corona Wind Projects") and the 345-kilovolt ("kV") transmission system and associated transmission facilities, including a 180-foot right-of-way located within a 1-mile-wide corridor (collectively, referred to as the "Corona Gen-Tie System" or "Gen-Tie System").

Q. PLEASE DESCRIBE YOUR EDUCATIONAL AND WORK BACKGROUND.

A. I am a 1998 graduate of the University of Wisconsin-Madison with a Bachelor of Arts in International Relations-Environmental Science. I have been working in the environmental consulting industry since 2002 and joined Burns & McDonnell as Senior Project Manager in 2016. My previous work experience includes positions as an Environmental Planner and Project Manager for environmental consulting and engineering firms located in San Diego,

California working on large and small-scale utility projects as a certified California Environmental Quality Act ("CEQA") consultant. I have managed major environmental compliance projects and project teams, including teams of subcontractors, and have prepared CEQA and National Environmental Policy Act compliance documents such as environmental impact reports and statements, initial studies, mitigated negative declarations, environmental assessments, and proponent's environmental assessments. In this capacity, I have assisted and managed aspects of siting and routing studies for transmission lines, solar, geothermal, and wind developments. My project work experience also includes work on land planning and development projects and interfacing and negotiating with federal, state, and local agencies to obtain project approvals and permits.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. My testimony supports the Corona Wind Companies' application for location control approval of the Corona Gen-Tie System, and Corona Wind Projects before the New Mexico Public Regulation Commission ("Commission") pursuant to NMSA 1978, §§62-9-3, 62-9-3.2 and Commission Rule 17.9.592 NMAC.

Q. HAVE YOU TESTIFIED BEFORE ANY REGULATORY AUTHORITIES BEFORE?

A. I have provided testimony before city and county boards in California.

Q. WHAT EXHIBIT DO YOU SPONSOR AS PART OF YOUR TESTIMONY?

A. I sponsor Exhibit CK-1, which is the environmental report prepared by Burns & McDonnell regarding the proposed Corona Gen-Tie System and the Corona Wind Projects ("Corona Environmental Report").

Q. WAS EXHIBIT CK-1 PREPARED BY YOU OR UNDER YOUR SUPERVISION?

A. Yes.

Q. WAS EXHIBIT CK-1 A TRUE AND CORRECT COPY OF THE DOCUMENT YOU DESCRIBED IN YOUR TESTIMONY?

A. Yes.

II. THE CORONA ENVIRONMENTAL REPORT

Q. WHY WAS THE CORONA ENVIRONMENTAL REPORT PREPARED?

A. The Corona Environmental Report in Exhibit CK-1 was prepared to comply with the requirement of NMSA 1978, §62-9-3 ("Siting Statute") and Commission Rule 17.9.592 NMAC ("Location Rule") regarding the Corona Wind Projects and the Corona Gen-Tie System. The Corona Environmental Report covers the location of the Corona Wind Projects ("Corona Wind Project Area") which includes the location of the Corona Gen-Tie System ("Corona Gen-Tie Study Corridor"). The Corona Wind Project Area consists of approximately 300,000 acres of land within Lincoln, Torrance and Guadalupe Counties in New Mexico.

Q. PLEASE EXPLAIN THE PURPOSE OF THE CORONA ENVIRONMENTAL REPORT WITH RESPECT TO THE SITING STATUE AND THE LOCATION RULE REGARDING THE CORONA WIND PROJECTS.

A. My understanding is that the Siting Statute states that the Commission shall approve the application for the location of the generating plant unless the Commission finds that the operations of the facilities for which approval is sought will not be in compliance with all applicable air and water pollution control standards and regulations existing. NMSA 1978,

§62-9-3(E). Similarly, the Location Rule, 17.9.592.9 NMAC, for generating facilities ("Generation Location Rule") requires an applicant to identify and show compliance or a statement of non-compliance of all applicable air and water pollution control standards and regulations to begin construction and to begin operation of the generating facilities. Sections 5.2 and 5.7 of the Corona Environmental Report provide analysis of these resources and demonstrate that the proposed Corona Wind Projects satisfy the requirements of both the Siting Statute and the Generation Location Rule.

Q. DOES THE INFORMATION CONTAINED IN THE CORONA ENVIRONMENTAL REPORT AND THE STUDIES UPON WHICH IT IS BASED SUPPORT THE CONCLUSION THAT THE CORONA WIND PROJECTS WILL COMPLY WITH ALL APPLICABLE AIR AND WATER POLLUTION CONTROL STANDARDS?

A. Yes.

Q. PLEASE EXPLAIN THE PURPOSE OF THE CORONA ENVIRONMENTAL REPORT WITH RESPECT TO THE SITING STATUE AND THE TRANSMISSION LOCATION RULE REGARDING THE CORONA GEN-TIE SYSTEM.

A. The Siting Statute and the Location Rule, 17.9.592.10 NMAC, for transmission lines ("Transmission Location Rule") identify the contents of applications for location approval of transmission lines associated with large generation facilities. The Siting Statute, requires the Commission to approve the location of a transmission line unless the Commission finds the location will unduly impair important environmental values. NMSA 1978, §62-9-3(F).

Moreover, the Transmission Location Rule, 17.9.592.10(E) NMAC, requires that "if preparation of a federal environmental assessment or environmental impact statement is not required under NEPA in connection with the transmission line, then a report, comparable to an environmental impact statement, in the format prescribed in 40 C.F.R. Section 1502.10" shall be included in the application. In this case, the Corona Gen-Tie System does not involve any federal actions that require the preparation of an environmental assessment or environmental impact statement. Accordingly, Pattern Energy Group LP together with Pattern Energy Group 2 LP ("Pattern Development"), in conjunction with its consultant, Burns & McDonnell, prepared the Corona Environmental Report in the same format prescribed in 40 C.F.R. Section 1502.10.

Q. WHAT FORMAT IS PRESCRIBED BY 40 C.F.R. SECTION 1502.10?

A. That federal regulation prescribes the following format:

(A) Cover sheet.
(B) Summary.
(C) Table of contents.
(D) Purpose of and need for action.
(E) Alternatives including proposed action.
(F) Affected environment.
(G) Environmental consequences.
(H) List of preparers.
(I) List of Agencies, Organizations, and persons to whom copies of the statement are sent.
(J) Index.
(K) Appendices (if any).

Q. DOES THE CORONA ENVIRONMENTAL REPORT FOLLOW THAT FORMAT?

A. Yes. However, "List of Agencies, Organizations, and persons to whom copies of the statement are sent", Section (I), is discussed in greater detail in the Direct Testimony of Adam Cernea Clark.

Q. WHAT ENVIRONMENTAL VALUES DOES THE CORONA ENVIRONMENTAL REPORT ADDRESS REGARDING THE CORONA GEN-TIE SYSTEM?

A. The Corona Environmental Report covers the environmental values identified in the Siting Statute and the Transmission Location Rule. According to Section M of the Siting Statute, NMSA 1978, §62-9-3(M), the environmental values the Commission may consider in making this determination include:

(1) existing plans of the state, local government, and private entities for other developments at or in the vicinity of the proposed location;

(2) fish, wildlife and plant life;

(3) noise emission levels and interference with communication signals;

(4) the proposed availability of the location to the public for recreational purposes, consistent with safety considerations and regulations;

(5) existing scenic areas, historic, cultural or religious sites and structures or archaeological sites at or in the vicinity of the proposed location; and,

(6) additional factors that require consideration under applicable federal and state laws pertaining to the location.

Additionally, the Transmission Location Rule requires an application for location approval of a transmission line to include testimony demonstrating that the transmission

line will not unduly impair important environmental values. According to the Transmission Location Rule, 17.9.592.10 NMAC, important environmental values include, but are not limited to, preservation of air and water quality, land uses, soils, flora and fauna, and water, mineral, socioeconomic, cultural, historic, religious, visual, geologic and geographic resources

Q. DOES THE ENVIRONMENTAL REPORT COVER ALL OF THE ENVIRONMENTAL VALUES IDENTIFIED IN THE SITING STATUTE AND TRANSMISSION LOCATION RULE?

A. Yes.

Q. DOES THE INFORMATION CONTAINED IN THE CORONA ENVIRONMENTAL REPORT AND THE STUDIES UPON WHICH IT IS BASED SUPPORT THE CONCLUSION THAT THE CORONA GEN-TIE SYSTEM WILL NOT UNDULY IMPAIR IMPORTANT ENVIRONMENTAL VALUES?

A. Yes.

III. THE CORONA WIND PROJECTS AND CORONA GEN-TIE SYSTEM COMPLIANCE WITH AIR AND WATER POLLUTION CONTROL STANDARDS

1. AIR POLLUTION CONTROL STANDARDS

Q. PLEASE CHARACTERIZE THE CORONA WIND PROJECTS' EXPECTED IMPACTS ON AIR QUALITY.

A. Development of the Corona Wind Projects and the Corona Gen-Tie System will have short-term impacts during construction. The equipment used during construction will likely be powered with diesel or gasoline fuel. These combustibles include pollutants such as nitrogen oxides, "NO_x", carbon monoxide, "CO", volatile organic compounds, "VOCs", particulate matter, "PM", small amounts of "SO_2" and trace amounts of hazardous air

pollutants. Construction contractors and their equipment will be required to comply with all emissions standards.

Short-term fugitive dust could arise from land clearing, grading, excavation, and vehicle traffic on unpaved roads. The amount of fugitive dust will depend on the amount of vehicular traffic, construction activities, moisture content of the soil, and wind speed. During dry periods with high winds, fugitive dust will be more prevalent than during wet periods with low winds. Dust suppression methods such as watering will be used in construction zones during dry periods to minimize fugitive dust impacts. The fugitive dust emissions and emissions from combustion engines will be temporary (limited to the construction period), limited to the construction area, and transient and likely controlled with watering, these sources will not significantly contribute to reduced air quality levels in the Corona Gen-Tie Study Corridor.

The operation of the Corona Wind Projects will result in long-term reduction of air pollutants that otherwise will have been emitted into the air by conventional power plants by supplanting some output from conventional power plants. Furthermore, the Corona Gen-Tie System will facilitate the delivery of clean renewable energy that has the potential to displace carbon as well as other hazardous emissions in the Southwestern United States, as a result of displacing fossil-based fuel.

Q. ARE THE CORONA WIND PROJECTS AND THE CORONA GEN-TIE SYSTEM WITHIN AN AREA THAT IS IN ATTAINMENT OF NATIONAL AND STATE AMBIENT AIR QUALITY STANDARDS?

A. Yes. The New Mexico Environment Department's Air Quality Bureau, which has authority over air quality in all areas of New Mexico except Bernalillo County and Tribal Lands, confirmed that Lincoln, Torrance and Guadalupe Counties, New Mexico, in which the Corona Wind Projects will be located, are currently in attainment of all national and state ambient air quality standards.

Q. WILL THE CORONA WIND PROJECTS AND THE CORONA GEN-TIE SYSTEM REQUIRE AIR POLLUTION CONTROL PERMITS FOR CONSTRUCTION?

A. Yes. A general construction permit, pursuant to the New Mexico Air Quality Control Act ("NMAQCA"), will be required for dust suppression during construction, and for aggregate crushing for use in road construction within the Corona Gen-Tie Study Corridor. See NMSA 1978, §§74-2-1 et seq.

For the Corona Wind Project Area, a separate general construction permit, pursuant to the NMAQCA, will also apply for the concrete batch plants for wind turbine pad foundations and dust suppression during construction. The Corona Wind Projects will also require the aforementioned general construction permit for aggregate crushing for use in road construction within the Corona Wind Project Area.

Q. WHEN ARE SUCH PERMITS TYPICALLY OBTAINED?

A. It is typical for the construction contractor to acquire such permits shortly prior to the start of construction. It is my understanding that the Corona Wind Companies will provide copies of the permits to the Commission upon request before construction has commenced.

2. WATER POLLUTION CONTROL STANDARDS

Q. PLEASE CHARACTERIZE THE EXPECTED IMPACTS ON WATER RESOURCES FROM THE

CORONA WIND PROJECTS AND THE CORONA GEN-TIE SYSTEM.

A. Development of the Corona Gen-Tie Study Corridor will have only minimal impacts on water quality during construction and should have no long-term impacts on water quality during operation. The Gen-Tie System facilities and structures will be sited to avoid placement near surface waters to the maximum extent practicable, which are shown generally on Exhibit 7 of the Corona Environmental Report, Exhibit CK-1. In the event that avoidance is not possible, and any facilities eventually are sited near surface waterways, Pattern Development will seek to permit any unavoidable fill in waters under the Nationwide Permit program administered by the U.S. Army Corps of Engineers ("USACE") under Section 404 of the Clean Water Act ("Section 404"). In addition, the Gen-Tie System transmission facilities will be sited to avoid mapped floodplain areas, shown in Exhibit 9 of the Corona Environmental Report, Exhibit CK-1. The topography of the Corona Gen-Tie Study Corridor is generally flat. Nevertheless, the Gen-Tie System facilities will be sited to avoid placement on steep slopes, which will minimize erosion and runoff into surface waters. Further, the Corona Wind Projects will implement a storm water management plan during construction to minimize the effects of storm water runoff in the event of significant rain events. During construction, water will be used to control dust on roads. The construction contractor will be required to obtain any necessary water permits.

Development of the Corona Wind Project Area will be similar to the Corona Gen-Tie Study Corridor and will have only minimal impacts on water quality during construction and should have no long-term impacts on water quality during operation. If avoidance is not

possible, and any wind facilities eventually are sited near surface waterways, the Joint Applicants will seek to permit any unavoidable fill in waters under the aforementioned Nationwide Permit program administered by the USACE under Section 404. In addition, the Corona Wind Projects will be sited to avoid mapped floodplain areas, shown in Exhibit 9 of the Corona Environmental Report, Exhibit, CK-1.

Wind energy generation is inherently a nearly zero-water consumption technology. The only primary uses of water during operations are for bathroom facilities for operations and maintenance workers at the operation & maintenance building, plus occasional cleaning of the wind turbine blades. A septic permit is expected to be obtained prior to operation. During construction, water will be used to make concrete and to control dust on roads. The construction contractor will be required to obtain any necessary water permits. In the long term, wind energy generation will help conserve water compared to other sources of electric generation that have major water use requirements.

Q. WHAT WATER POLLUTION CONTROL PERMITS WILL THE CORONA WIND PROJECTS AND THE CORONA GEN-TIE SYSTEM REQUIRE FOR CONSTRUCTION?

A. Prior to construction, Pattern Development will obtain coverage under a National Pollution Discharge Elimination System ("NPDES") Construction General Permit ("CGP") from the United States Environmental Protection Agency pursuant to Section 402 of the Clean Water Act, 33 U.S.C. §1342. The requirements of the CGP include, but are not limited to, the operator filing a notice of intent at least 14 days before commencing construction activities, preparing a Storm Water Pollution Prevention Plan that describes measures to control storm water discharge during construction and the

implementation of standard erosion control measures and best management practices. The Corona Wind Projects are not expected to adversely affect surface or groundwater at the site and do not require a permit under the New Mexico Water Quality Control Act other than a septic permit.

Q. WHEN ARE SUCH PERMITS TYPICALLY OBTAINED?

A. As with construction-phase air quality permits, coverage under the NPDES CGP is typically obtained just prior to construction, and a septic permit is obtained when bathroom facilities are installed (Corona Wind Project Area only). Pattern Development will obtain NPDES coverage prior to start of construction. It is my understanding that the Joint Applicants will commit to filing notification with the Commission of coverage under the NPDES CGP as obtained prior to construction.

Q. WHAT WATER POLLUTION CONTROL PERMITS WILL THE CORONA WIND PROJECTS REQUIRE FOR OPERATION?

A. Transmission line facilities and wind energy generation facilities require almost no water for the operation and generation of electricity. Accordingly, no water pollution control permits are needed for operation.

Q. IN SUMMARY WILL THE CORONA WIND PROJECTS BE IN COMPLIANCE WITH ALL APPLICABLE AIR AND WATER POLLUTION CONTROL STANDARDS?

A. Yes, the Corona Wind Projects will also be in compliance with all applicable air and water pollution control standards.

Q. IN SUMMARY WILL THE CORONA GEN-TIE SYSTEM ALSO BE IN COMPLIANCE WITH ALL APPLICABLE AIR AND WATER POLLUTION CONTROL STANDARDS?

A. Yes, the Corona Gen-Tie System will be in compliance with all applicable air and water pollution control standards.

3. IMPORTANT ENVIRONMENTAL VALUES

Q. HAS PATTERN DEVELOPMENT EVALUATED THE CORONA GEN-TIE SYSTEM'S POTENTIAL IMPACTS ON THE FACTORS THE COMMISSION MAY CONSIDER IN DETERMINING WHETHER LOCATION OF A TRANSMISSION LINE WILL UNDULY IMPAIR IMPORTANT ENVIRONMENTAL VALUES?

A. Yes, there has been a review of the factors provided in NMSA 1978, §62-9-3(M), the Transmission Location Rule, and additional factors, which include existing plans for development of the proposed location; fish, wildlife, and plant life; noise levels; interference with communication signals; availability for recreational purposes; scenic, historic, cultural or religious sites and structures or archeological sites; cemeteries and burials; schools; military activities; aviation; soils; minerals and mining; geologic and paleontological resources; roads; geographic resources; and hazardous materials. Pattern Development considered these factors, as a matter of good business practice, throughout the Corona Wind Projects and Gen-Tie System. However, the focus of my testimony and the Corona Environmental Report is on the Corona Gen-Tie System which is the proper subject matter of the Commission's jurisdiction over these environmental factors.

Q. HAS PATTERN DEVELOPMENT CONSIDERED THE POTENTIAL IMPACTS ON THESE SAME FACTORS REGARDING THE CORONA WIND PROJECTS?

A. Yes, this work was performed for the Corona Wind Projects even though I understand this

exceeds the requirements of the Siting Statute and the Location Rule and such analysis is only required for transmission lines associated with large capacity power plants.

Q. PLEASE SUMMARIZE YOUR FINDINGS WITH RESPECT TO EXISTING PLANS FOR OTHER DEVELOPMENTS AT THE CORONA WIND PROJECT AREA?

A. The Corona Wind Project Area, which includes the Corona Gen-Tie Study Corridor, is located on private land owned by participating landowners, as well as state trust land. It is my understanding that wind development and ranching operations constitute the planned development activities within the Corona Wind Project Area. Moreover, the Corona Wind Projects and Gen-Tie System represent additional long-term revenue for the State of New Mexico.

Q. PLEASE SUMMARIZE YOUR FINDINGS WITH RESPECT TO AIR QUALITY?

A. As I previously explained in my testimony, all required air permits will be obtained, and the Corona Wind Projects and the Corona Gen-Tie System are not expected to adversely impact air quality. The Corona Gen-Tie System is anticipated to have *de minimus* impacts to air quality. Further discussion of air resources is provided in Sections 4.2 and 5.2 of the Corona Environmental Report, Exhibit CK-1.

Additionally, the Corona Wind Projects are also anticipated to have *de minimus* impacts to air quality. Indeed, the Corona Wind Projects are expected to improve air quality by displacing the need for traditional means of energy generation that have negative impacts to air quality.

Q. PLEASE SUMMARIZE YOUR FINDINGS WITH RESPECT TO WATER QUALITY AND WATER RESOURCES?

A. The Corona Gen-Tie System is not anticipated to materially impair water quality and water resources. As I explained previously in my testimony, all required water quality permits will be obtained, if needed, and the Corona Gen-Tie System is not expected to adversely impact water quality or water resources. Furthermore, the Corona Wind Projects are also not anticipated to have material negative impacts to water quality. Indeed, the Corona Wind Projects are anticipated to have significant positive benefits to water resources by displacing water-intensive energy generation sources. Further discussion of water resources is provided in Sections 4.7 and 5.7 of the Corona Environmental Report, Exhibit CK-1.

Q. PLEASE SUMMARIZE YOUR FINDINGS WITH RESPECT TO LAND USES?

A. In my testimony, I describe existing land uses and explain that the Corona Wind Projects' facilities are expected to utilize only a small portion of the approximately 300,000-acre Corona Wind Project Area, leaving the large majority of the land not utilized for project infrastructure available for its existing land use, which is primarily agriculture. My understanding is that Pattern Development will locate facilities only on lands for which agreements have been reached with underlying land owners. Both the Corona Gen-Tie System and the Corona Wind Projects are generally consistent with the land use policies of the respective counties and will comply with the State Land Office ("SLO") leasing regulations on state trust lands that may be used in developing the Corona Wind Projects. Further discussion of land uses is provided in Sections 4.12 and 5.12 of the Corona Environmental Report, Exhibit CK-1.

Q. PLEASE SUMMARIZE YOUR EFFORTS TO AVOID AND MINIMIZE IMPACTS WITH RESPECT TO FLORA AND FAUNA ON THE CORONA WIND PROJECT AREA?

A. Because of the relatively modest impacts of transmission lines to wildlife habitat and flora and fauna and the voluntary commitments and Best Management Practices ("BMP") practiced by Pattern Development, the Corona Gen-Tie System will not have material impacts to flora and fauna. Protection measures that would be implemented to reduce any potential negative flora and fauna resource impacts from construction activities include those commitments described in Section 5.8 of the Corona Environmental Report, Exhibit CK-1. These include:

Bio-1: Properly disposing of trash and food debris in secured containers;

Bio-2: Allowing wildlife that has entered the work area to leave the area on their own;

Bio-3: Providing environmental awareness training to all construction personnel working on the Gen-Tie System;

Bio-4: Checking for wildlife under vehicles and equipment that have been stationary for more than 1 hour and each morning prior to moving or operation;

Bio-5: Checking trenches, excavations, and uncapped pipe segments for wildlife;

Bio-6: Complying with posted speed limits;

Bio-7: Conducting tree/vegetation clearing outside the nesting season where feasible, to discourage birds from establishing nests in the Gen-Tie System work areas;

Bio-8: Conducting pre-construction nest surveys prior to initiating construction activities, unless vegetation clearing has been completed prior to the nesting season;

Bio-9: Establishing an appropriate buffer zone around occupied raptor nests, as necessary to minimize disturbance;

Bio-10: Design transmission line facilities to APLIC guidance or similar in order to minimize electrocution and collision risk;

Bio-11: Micrositing will be completed during engineering design to avoid sensitive biological resources;

Bio-12: Setbacks from sensitive biological resources will be implemented to protect species habitat and time critical periods (e.g., breeding season); and

Bio-13: Install bird diverters near areas with increased risk for avian-collision risk, to minimize collision risk for avian species.

A discussion of flora and fauna is also provided in Sections 4.8 and 5.8 of the Corona Environmental Report, Exhibit CK-1. As is discussed in greater detail in the Direct Testimony of Adam Cernea Clark, the Corona Wind Projects have implemented voluntary avoidance protocols for various biological resources, such as raptor nests. In addition to utilizing voluntary environmental setbacks, Pattern Development will follow Avian Powerline Interaction Committee ("APLIC") guidance to implement measures that will minimize collision risk with proper siting and electrocution risk with proper transmission line engineering design. In areas of greater risk (e.g. near wetlands) for avian collisions Pattern Development will install bird diverters to minimize collision risk for avian species. Pattern Development's implementation of APLIC guidance is discussed in greater detail in the Direct Testimony of Adam Cernea Clark.

The aforementioned voluntary commitments apply to both the Corona Wind Projects generally and the Corona Gen-Tie System specifically. Due to the foregoing BMPs and siting methodology discussed in the Corona Environmental Report and the Direct Testimony of Adam Cernea Clark, it is our belief that the Corona Wind Projects will not have material negative impacts to sensitive flora and fauna.

Q. PLEASE SUMMARIZE YOUR FINDINGS WITH RESPECT TO POTENTIAL NOISE IMPACTS?

A. The 345-kV transmission system and associated transmission facilities of the Gen-Tie System will not generally impair noise within the Corona Wind Project Area. The Corona Gen-Tie Study Corridor itself is sparsely populated. As such, there are no significant concentrations of homes or other receptors. Furthermore, the Corona Gen-Tie System and the entire Corona Wind Project Area is located entirely within private property of participating landowners or within state trust land. Pattern Development has worked with participating landowners to assure appropriate setbacks from homes and other receptors. Wind turbines within the Corona Wind Project Area will be setback from any homes and other important receptors, in accordance with local ordinances, and located entirely within participating landowner properties or within state trust lands. Pattern Development has sited turbines to minimize sound-level concerns at neighboring homes. Further discussion of noise is provided in Sections 4.3 and 5.3 of the Corona Environmental Report, Exhibit CK-1.

Q. WILL THE CORONA GEN-TIE SYSTEM INTERFERE WITH COMMUNICATION SIGNALS?

A. Development and operation of the Corona Gen-Tie System is not expected to interfere with or impair communication signals. The beam paths identified, which are depicted in

Exhibit 20 of the Corona Environmental Report, Exhibit CK-1, have been incorporated into the preliminary site layout and disruption to the signal will be avoided in the final layout. Pattern Development conducted a review of coordinates at the north, south, east, and west points of the Corona Gen-Tie Study Corridor, with an expanded search to 35 miles from the edge of the Corona Gen-Tie Study Corridor endpoints, which indicates that no microwave towers, antenna structure registration towers, or AM/FM/TV towers are present. The transmission line facilities will avoid AM and FM station towers to the extent practicable if new tower facilities are developed.

Impacts with communication signals will be similar for the entire Corona Wind Project Area, as previously discussed for the Corona Gen-Tie Study Corridor. The beam paths identified, have been incorporated into the preliminary wind turbine layout and disruption to the signal will be avoided in the final layout. Wind turbines will be sited such that they should not interfere with or interrupt these communication paths, regardless of which direction the wind turbine is facing. Further discussion of communication signals is provided in Sections 4.14 and 5.14 of the Corona Environmental Report, Exhibit CK-1.

Q. WILL CORONA GEN-TIE SYSTEM IMPACT RECREATIONAL USES?

A. The Corona Gen-Tie System is not anticipated to impair recreational uses. The Corona Gen-Tie System Corridor is primarily agricultural land used for grazing and cultivation and is not known to support major or organized recreational activities. However, landowners reserve the right to recreate on their properties, provided such recreation does not unduly interfere with the Corona Wind Projects. Near the Corona Gen-Tie Study Corridor, the primary recreational activity identified is occasional hunting. This activity is

expected to continue throughout the Corona Wind Project Area (inclusive of the Corona Gen-Tie Corridor). Pattern Development expects to work with landowners for a temporary period during construction to confirm that there are no undue safety risks to either the construction crews or to hunters. Furthermore, Pattern Development has worked with environmental specialists to create wildlife training materials, which are discussed in the Direct Testimony of Adam Cernea Clark. The previous discussion also applies to the Corona Wind Project Area as well. Further discussion of recreational use is provided in Sections 4.12 and 5.12 of the Corona Environmental Report, Exhibit CK-1.

Q. WHAT VISUAL IMPACT WILL THE CORONA GEN-TIE SYSTEM HAVE?

A. Visual impacts from the Corona Gen-Tie System, as discussed below, will be modest and consistent with the existing environment (e.g., the Corona Wind Project Area already has existing transmission facilities within the vicinity) and it is not believed that the Gen-Tie System will materially impair visual resources. Furthermore, because the Gen-Tie System will be entirely located within the Corona Wind Project Area, these impacts are consistent with the goals and objectives of both the participating landowners as well as the counties, as evidenced by Lincoln County Comprehensive Plan and Torrance County Comprehensive Plan promoting the development of wind energy and associated transmission infrastructure.

Topography within the Corona Gen-Tie Study Corridor is variable, including relatively flat grassland, gentle slopes, small ridgelines, canyons, hills, mesas, canyons and steep slopes. Herbaceous/grassland cover types dominate the landscape, with shrub/scrub and evergreen forest vegetation communities covering smaller areas of the Corona Wind Project Area.

Land use within the Corona Gen-Tie Study Corridor is primarily open range livestock grazing. Portions of the southern Corona Gen-Tie Study Corridor border private land abutting the Jicarilla Mountains, located in the northeastern extent of the Lincoln National Forest, with several larger ridges and peaks. Elevation within the Corona Wind Project Area ranges from 5,955 to 7,100 feet (1,815 to 2,164 meters [m]) above mean sea level (see Exhibit 13 of the Corona Environmental Report, Exhibit CK-1).

Lincoln, Torrance and Guadalupe Counties all have low population densities, particularly within the Corona Wind Project Area. The population density for Lincoln County is approximately 4.2 inhabitants per square mile, with most of the population in the county's southern portion in the Greater Ruidoso Area. Torrance County is a large and rather sparsely-populated county located in central New Mexico, southeast of the City of Albuquerque. Over 95 percent of the population resides in the western half of the County. Guadalupe County is the fifth-least populous county in New Mexico and has a total area of 3,032 square miles. There are several inhabitable residences within the Corona Gen-Tie Study Corridor and other scattered rural residences and small communities that are nearby. Travelers in proximity to the Corona Gen-Tie Study Corridor will include local or regional traffic along New Mexico State Roads 54 and 247.

Existing transmission lines (100-kV or above) in the vicinity of the Corona Wind Projects include: the Willard to Duran 115-kV line, situated along the northwest portion of the Corona Wind Projects; the Corona to Guadalupe 500-kV line, situated northeast of the Corona Wind Projects Area; the Corona to Blackwater 500-kV line, situated east of the Corona Wind Projects' Area; the proposed Pinal Central to SunZia Transmission LLC's

East terminus 500-kV line, situated along the southwest portion of the Corona Wind Projects; and the Ft. Craig to Corona 500-kV line, also situated along the southeastern portion of the Corona Wind Projects (Exhibit 14 of the Corona Environmental Report, Exhibit CK-1).

There are no designated federal or state scenic routes or byways in the vicinity of the Corona Gen-Tie Study Corridor (New Mexico Department of Transportation "NMDOT", 2015; Federal Highway Administration "FHWA", 2017) (see Exhibit 15 of the Corona Environmental Report, Exhibit CK-1). The nearest scenic route is Historic Route 66, which is more than 35 miles from the Corona Gen-Tie Study Corridor to the north. Additionally, there are no national parks or state parks in the vicinity of the Corona Gen-Tie Study Corridor. The closest national park is Salinas Pueblo Missions National Monument, which is approximately 15 miles west of the Corona Gen-Tie Study Corridor, and the closest state parks are the Santa Rosa Lake State Park, Sumner Lake State Park, and Manzano Mountains State Park all located more than 35 miles from the Corona Gen-Tie Study Corridor. There are no known visually sensitive, cultural resource sites in the vicinity of the Corona Gen-Tie Study Corridor. There are no known organized tourism activities in or near the Corona Gen-Tie Study Corridor. Further discussion of visual and scenic resources is provided in Sections 4.11 and 5.11 of the Corona Environmental Report, Exhibit CK-1. The previous discussion also applies to the Corona Wind Project Area. The wind turbines will be visible in the local area. The Corona Wind Projects' wind turbines will be similar in style to the ones already operating in this region of the State of New Mexico.

Q. WHAT IMPACT WILL THE CORONA GEN-TIE SYSTEM HAVE ON HISTORIC, CULTURAL, AND ARCHAEOLOGICAL RESOURCES?

A. Impacts to historical, cultural, and archaeological resources from the Corona Gen-Tie System are expected to be *de minimus,* if any. Along the proposed transmission line, five historic sites have been recorded. One of these historic sites is the remnants of a homestead and has been recommended to be eligible for listing on the National Register of Historic Places, a single site is historic artifact scatter with no recommendation of eligibility, and the final three sites have no data in the New Mexico Cultural Resource Information System ("NMCRIS") except for locations. Within the Corona Wind Project Area historic sites, consisting primarily of isolated historic trash dumps or ruins of structures associated with ranching activities have been recorded. The historic sites of the area are associated with primarily ranching activities. No historic research activities have been conducted within the Corona Wind Project Area, and, as such, none of the structures have been researched for their contributions to the historical development of the local area. However, cultural resource surveys will be completed throughout prior to finalizing design wherever ground disturbance activities are planned. The Corona Gen-Tie System will avoid impacts to historic, cultural, and archeological resources that are discovered during construction on both private and state land to the maximum extent practicable. Pattern Development's avoidance protocols and siting philosophy is discussed in greater detail in the Direct Testimony of Adam Cernea Clark and the Corona Environmental Report. Pattern Development will implement an Unanticipated Discoveries Protocol to properly address unexpected discoveries during construction. Further discussion of historic, cultural, and

archeological resources is provided in Sections 4.9 and 5.9 of the Corona Environmental Report, Exhibit CK-1. The foregoing avoidance strategies apply as well to the Corona Wind Projects.

Q. WILL CORONA GEN-TIE SYSTEM IMPACT CEMETERIES OR BURIALS?

A. No. NMCRIS, the Church Index, and the Cemetery Index of Lincoln, Torrance, and Guadalupe Counties were used to identify religious structures and sites. See Exhibit 11 of the Corona Environmental Report, Exhibit CK-1. None of the churches or known cemeteries are located in close proximity to the transmission line. There could be unidentified formal and informal cemeteries associated with the active and abandoned ranches within the footprint of the proposed transmission line. The Corona Wind Projects will avoid these sites and any unanticipated discoveries during construction as discussed in Sections 4.10 and 5.10 and identified on Exhibit 11 of the Corona Environmental Report, Exhibit CK-1. Two cemeteries are identified within the Corona Wind Project Area, one at Carrajal in Lincoln County and one near Duran in Torrance County (see Exhibit 11 of the Corona Environmental Report, Exhibit CK-1). Additional unidentified formal and informal cemeteries associated with the active and abandoned ranches could be throughout the Corona Wind Project Area. Further discussion of cemeteries and burials is provided in Sections 4.10 and 5.10 of the Corona Environmental Report, Exhibit CK-1. The foregoing applies as well to the Corona Wind Projects as a whole.

Q. WILL THE CORONA GEN-TIE SYSTEM IMPACT ANY SCHOOLS?

A. No. The Gen-Tie System will not physically impact schools. As shown on Exhibit 17 of the Corona Environmental Report, Exhibit CK-1, the Corona Elementary/High School is

located about 3 miles west of the Corona Gen-Tie Study Corridor boundary, the Estancia Elementary/Middle/High School is located approximately 33 miles north of the Corona Gen-Tie Study Corridor boundary and the Vaughn Elementary/High School is located approximately 12 miles north of the Corona Gen-Tie Study Corridor boundary. No direct or indirect impacts to schools will occur as a result of the construction, operation, and maintenance of the transmission line facilities. Siting of transmission line facilities will follow industry standard siting guidelines. Although the Corona Elementary/High School is located about 0.1 mile west of the Corona Wind Project Area boundary, the previously land use impacts identified for the Corona Gen-Tie Study Corridor also apply for the Corona Wind Project Area. The Corona Gen-Tie System and the Corona Wind Projects' planned use of state trust land will contribute meaningful revenue to the state that is earmarked for the benefit of schools. Further, payments-in-lieu-of-taxes associated with industrial revenue bonds to be negotiated with counties and municipalities will have major impacts on the long-term fiscal outlook of schools in the area. Further discussion of schools is provided in Sections 4.12 and 5.12 of the Corona Environmental Report, Exhibit CK-1.

Q. WILL THE CORONA GEN-TIE SYSTEM IMPACT ANY RELIGIOUS SITE?

A. No. The Gen-Tie System will avoid impacts to existing religious buildings and sites in the area. Further discussion of religious sites is provided in Sections 4.10 and 5.10 of the Corona Environmental Report, Exhibit CK-1. The foregoing applies as well to the Corona Wind Projects generally.

Q. WILL THE CORONA GEN-TIE SYSTEM CONFLICT WITH MILITARY ACTIVITIES?

A. No. The Corona Gen-Tie System will not conflict with military activities. Further discussion of military activities is provided in Sections 4.19 and 5.19 of the Corona Environmental Report, Exhibit CK-1. Pattern Development has communicated with local military bases and is working with the United States Department of Defense ("DoD") and local military bases to address potential impacts on military activities in the area. Pattern Development will continue to coordinate with military bases.

Q. WILL THE CORONA GEN-TIE SYSTEM ADVERSELY AFFECT AVIATION?

A. No, it will not adversely affect aviation. Approximately 10 military training routes occur in the vicinity of the Gen-Tie System (see Exhibit 21 of the Corona Environmental Report, Exhibit CK-1). However, none of these routes conflict with the Corona Gen-Tie Study Corridor. Pattern Development will work with the United States Federal Aviation Administration ("FAA") to request Determination of No Hazard ("DNH") for the Gen-Tie System facilities. Based on the height of transmission line facilities and the location of military and aviation resources, the transmission line facility construction, operation, and maintenance, within the Corona Gen-Tie Study Corridor will not impact military activities and aviation.

As discussed in the previous answer, Pattern Development is working closely with local military bases and the DoD as well as the FAA. Prior to construction, Pattern Development will submit requests for DNH to the FAA for each proposed wind turbine site, plus extra locations as alternates in case issues arise with any requested turbine location. This Form FAA 7460-1 process (Notice of Proposed Construction or Alteration) is required

by the FAA for any structure over 200 feet. Upon review of the Joint Applicant's Form FAA 7460-1, the FAA will consider aviation safety, airport approaches, and military flight activities. Turbines will be lit with FAA-compliant safety lighting per the turbine-specific recommendations resulting from the 7460-1 process. Turbines will be lit no more than required by the FAA. Further discussion of aviation is provided in Sections 4.19 and 5.19 of the Corona Environmental Report, Exhibit CK-1.

Q. WILL CORONA GEN-TIE SYSTEM ADVERSELY AFFECT SOILS?

A. No. Soils in the Corona Gen-Tie Study Corridor, shown on Exhibit 3 of the Corona Environmental Report, Exhibit CK-1, are an important agricultural resource. The finished footprint of the Corona Wind Projects will cover only small portion of the land in the Corona Gen-Tie Study Corridor, leaving the remaining areas in their prior uses. In addition, topsoil is planned to be stockpiled and replaced, and erosion control and best management practices will be employed during construction, in compliance with the Corona Wind Projects' Storm Water Pollution Prevention Plan. The Corona Wind Projects are consistent with Lincoln Soil and Water Conservation District Land Use Plan and East Torrance Soil and Water Conservation District Long Range Land Use Plan. The same discussion and conclusion applies to the Corona Wind Project Area. Further discussion of soils is provided in Sections 4.5 and 5.5 of the Corona Environmental Report, Exhibit CK-1.

Q. WILL THE CORONA GEN-TIE SYSTEM ADVERSELY AFFECT MINERALS OR MINING?

A. No. There are few oil and gas wells in the vicinity of the Corona Gen-Tie Study Corridor (see Exhibit 4 of the Corona Environmental Report, Exhibit CK-1) but these wells will be avoided. There are current oil/natural gas leases within the Lincoln and Torrance Counties,

most of these leases are to support exploration drilling projects for hydrocarbons. Torrance County exploration wells have located very deep oil and gas deposits in the Estancia Basin in the northern portion the Corona Wind Project Area; however, these deposits have yet to be exploited. Guadalupe County has oil and natural gas leases; however, most are located to the northeast and out of the Corona Wind Project Area in the Tucumcari Basin. There are currently no major exploration activities within the Corona Gen-Tie Study Corridor. Mining has always been important to the economies of these three counties, but due to many of the mineral deposits being limited or the extraction process too expensive, all mines within the Corona Gen-Tie Study Corridor have been shut down. Similarly, there are currently no major exploration activities within the Corona Wind Project Area.

Q. WILL THE CORONA GEN-TIE SYSTEM ADVERSELY AFFECT GEOLOGIC OR PALEONTOLOGICAL RESOURCES?

A. No. Geology in the Corona Gen-Tie Study Corridor is shown on Exhibit 3 of the Corona Environmental Report, Exhibit CK-1. Gems, minerals, and rocks of interest may exist in the Corona Gen-Tie Study Corridor just as they may exist in many parts of New Mexico. Paleontological finds also have occurred in many parts of New Mexico. While no paleontological resources are known in the Corona Gen-Tie Study Corridor, in the event any are identified, current or planned activity in the affected area will stop, and Pattern Development will make notifications to the appropriate authorities and consultations regarding follow-up activities will occur, in accordance with the Unanticipated Discoveries Protocol. This same discussion also applies to the Corona Wind Project Area. Further

discussion of geology and paleontology resources is provided in Sections 4.4, 4.6, 5.4 and 5.6 of the Corona Environmental Report, Exhibit CK-1.

Q. WILL THE CORONA GEN-TIE SYSTEM ADVERSELY AFFECT ROADS?

A. Local roads are shown on Exhibit 16 of the Corona Environmental Report, Exhibit CK-1. Prior to construction, Pattern Development plans to negotiate and execute a road use agreement with Lincoln, Torrance and Guadalupe Counties. The road use agreement will identify the county roads that the Corona Wind Projects are allowed to use for heavy haul vehicles, mainly during construction. It will identify responsibilities for maintenance and upkeep of these county roads during and after construction, especially for wear and tear or damage caused by the Corona Wind Projects-related traffic. The agreement will establish traffic safety measures to confirm the safety of the driving public. The road use agreement will address dust mitigation measures on county roads resulting from construction traffic. The pre-construction conditions of county roads will be documented, prior to construction, typically by video recording, and the Corona Wind Projects will confirm that county roads are generally in the same or better condition upon completion. Financial security will be proposed to confirm Pattern Development's compliance with the agreement. Prior to the movement of any super-load trucks on other public roads, Pattern Development will consult with any necessary state and federal transportation authorities and will obtain any required permits. Discussion of road use is provided in Sections 4.20 and 5.20 of the Corona Environmental Report, Exhibit CK-1.

Q. WILL THE CORONA GEN-TIE SYSTEM ADVERSELY AFFECT GEOGRAPHIC RESOURCES?

A. No. There are no national parks or state parks in the vicinity of the Corona Gen-Tie Study

Corridor. The closest national park is Salinas Pueblo Missions National Monument, which is more than 15 miles away, and the closest state parks are the Santa Rosa Lake State Park, Sumner Lake State Park, and Manzano Mountains State Park which are all located more than 35 miles away. There are no national parks or state parks in the vicinity of the Corona Wind Project Area as well. The foregoing applies as well to the Corona Wind Projects. A discussion of geographic resources is provided in Sections 4.18 and 5.18 of the Corona Environmental Report, Exhibit CK-1.

Q. DOES PATTERN DEVELOPMENT EXPECT TO ENCOUNTER RADIOACTIVE WASTE OR RADIATION HAZARDS?

A. No. Transmission projects and wind generation projects do not generate or contain radioactive waste or radiation hazards, as noted in Sections 4.15 and 5.15 of the Corona Environmental Report, Exhibit CK-1.

Q. DOES PATTERN DEVELOPMENT EXPECT TO ENCOUNTER ASBESTOS OR OTHER MATERIALS THAT REQUIRE SPECIAL HANDLING?

A. No. The vast majority of the Corona Gen-Tie Study Corridor has never had any construction activity or structures or facilities that could have included asbestos or other materials that require special handling, so all or nearly all of the Corona Wind Projects' related construction activity will be sited away from such materials. Prior to construction, Pattern Development will perform a Phase 1 Environmental Screening Assessment to identify any hazardous materials, substances, or facilities in the Corona Gen-Tie Study Corridor, and any such items identified will be avoided. Further, in the unlikely event that there are hazardous materials or wastes that are present at the site and associated with the

Corona Wind Projects will be properly contained, and a spill response plan will be in place to confirm that, in the event of an accidental spill or leakage, there will be no contamination or transmission downstream. The same discussion applies to the Corona Wind Project Area. Discussion of hazardous materials is provided in Sections 4.16 and 5.16 of the Corona Environmental Report, Exhibit CK-1.

Q. WHAT EFFORTS WILL PATTERN DEVELOPMENT MAKE TO PROTECT PUBLIC SAFETY AROUND THE CORONA WIND PROJECTS?

A. Safety will remain a priority of the Corona Wind Projects throughout construction, operation, and eventual decommissioning. Pattern Development will comply with all manufacturer specifications and relevant OSHA requirements to confirm the safety of residents, employees, contractors, livestock, the public, and other users of the land. Additionally, Lincoln, Torrance and Guadalupe County emergency responders and fire districts will be contacted to confirm appropriate plans are in place at the Corona Wind Projects to quickly respond to any emergencies. Pattern Development will communicate with Lincoln, Torrance and Guadalupe County fire departments in order to coordinate emergency response plans prior to the start of construction. Pattern Development will work with the departments to confirm the safety of the firefighters, employees, landowners, neighbors, livestock, and other users of the land. Corona Wind Projects' employees and contractors will all participate in fire prevention/fighting training to confirm their preparedness and participation in fire protection. An annual firefighting practical examination will be completed onsite, including a live drill, to confirm the Corona Wind Projects' employees have maintained their training. This training will be offered to the

local fire departments too. The Corona Wind Projects will have emergency response plans in place to respond to various natural disasters, even though the Corona Project Area and the Corona Gen-Tie Study Corridor generally are not considered to be high-risk sites. Within the Corona Wind Project Area, electrical substations and transformers will be located inside locked fences or enclosures, and they will be clearly marked to show that energized electrical equipment is located inside. Modern wind turbines are inherently unclimbable by the general public, since there are no exterior ladders or lattice work, and interior ladders are secured behind locked doors located at the bases of the turbine towers. Discussion of public safety is provided in Sections 4.17 and 5.17 of the Corona Environmental Report, Exhibit CK-1.

Q. HAS PATTERN DEVELOPMENT IDENTIFIED PROTECTION MEASURES IT WILL IMPLEMENT TO AVOID AND MANAGE IMPACTS TO RESOURCES YOU REVIEWED ABOVE?

A. Yes. The measures Pattern Development will implement are identified in Section 5.0 of the Corona Environmental Report, Exhibit CK-1.

Q. WILL THE CORONA WIND PROJECTS RESULT IN ENVIRONMENTAL BENEFITS?

A. Yes. To the extent that the electric generation by the wind component of the Corona Wind Projects displaces generation from fossil-fuel fired sources such as coal and gas generation, it will result in reduced emission of greenhouse gases and air pollutants, which will benefit the State of New Mexico and the region. The renewable energy generation will conserve scarce water resources and will not discharge pollutants. The Corona Wind Projects will use only a small portion of the land area, leaving the remaining land available for pre-existing uses such as agriculture, rangeland and wildlife habitat. Micro-siting of the

transmission line facilities and wind turbines will avoid sensitive resources. Furthermore, the development of the Corona Gen-Tie System provides an electrical transmission link to the areas high-wind speed resources and the electric grid, which benefit should continue long into the future irrespective of the life of the Corona Wind Projects.

IV. LAND USE, LAND OWNERSHIP, AND COMPLIANCE WITH LAND USE STATUTES AND ADMINISTRATIVE REGULATIONS

Q. PLEASE DESCRIBE THE EXISTING LAND OWNERSHIP AND LAND USES ON THE CORONA WIND PROJECT AREA.

A. The Corona Wind Projects encompass approximately 300,000 acres on primarily private land, as well as some state trust land. About 85 to 90 % of Corona Wind Project Area is expected to consist of private land, and about 10 to 15% of which may consist of state trust land. No federal land is planned to be used. Pattern Development has applied to the SLO for a real estate leases for about 21,000 acres of state trust land and expects to apply for additional real estate leases for approximately 13,000 acres of state trust land. It is possible that additional private landowners and state trust land parcels will be incorporated into the Corona Wind Project Area. The type of land ownership is shown on Exhibit 19 of the Corona Environmental Report, Exhibit CK-1. The current land use of the Corona Gen-Tie Study Corridor is predominantly agricultural, with a mix of grazing, cultivation, dairies, and Conservation Reserve Program uses.

Q. WILL THESE USES CONTINUE FOLLOWING CONSTRUCTION OF THE WIND FARM?

A. Yes. When construction is complete, the Corona Wind Projects' facilities are expected to utilize a small portion of the approximately 300,000-acre Corona Wind Project Area, thus

leaving the remaining unutilized land available for its existing land use. As discussed above, the Corona Wind Projects will not interfere with land use in the vicinity of the Corona Wind Projects. In some ways, the Corona Wind Projects will enhance the ability of landowners to utilize their land for agriculture because the Corona Wind Projects will make annual payments to landowners that will be a steady new income stream, independent of commodity prices, drought, and other factors that affect the economics of agriculture. In some cases, the extra income from the Corona Wind Projects may enable landowners to stay on their land and reinvest in and continue their current agricultural practices.

Q. HAS PATTERN DEVELOPMENT SECURED LAND RIGHTS FOR THE CORONA WIND PROJECTS FROM THE PRIVATE LANDOWNERS?

A. Yes. I am informed that Pattern Development has executed lease option agreements for the private acreage. Lease option agreements provide for a right to both develop, construct, and operate wind facilities and transmission infrastructure. Additional landowners adjacent or nearby the Corona Wind Project Area may yet contact Pattern Development with an interest in signing a lease agreement, and Pattern Development intends to continue to entertain such inquiries. The location control approval, if granted by the Commission, is only intended to apply to land within the Corona Gen-Tie Study Corridor that is currently or ultimately signed for the Corona Wind Projects' use.

Q. DO THE CORONA WIND PROJECTS REQUIRE USE OF STATE LANDS?

A. The state trust land is not necessarily required for the Corona Wind Projects' viability, but its inclusion will enhance flexibility of turbine and facilities siting. Because the alignment of the Corona Gen-Tie System and the Corona Gen-Tie Study Corridor is dependent on the

locations of wind turbines, the amount and location of state trust lands to be leased by the Corona Wind Projects indirectly affects the alignment and location of the Gen-Tie System.

Q. WHAT LAND USE STATUTES AND ADMINISTRATIVE REGULATIONS APPLY TO THE CORONA WIND PROJECT AREA, SPECIFICALLY TO THE CORONA GEN-TIE SYSTEM?

A. Lincoln and Guadalupe Counties do not have any zoning regulations that apply to transmission line facilities. As party of Lincoln County's Economic and Development Vision and Goals, the vast open acres of farm and ranchland are envisioned to potentially be used to produce solar and wind energy to supplement farmers' incomes and promote business development in areas outside Ruidoso to better distribute employment around the southcentral part of the Lincoln County. The Gen-Tie System is consistent with Lincoln County's recommended Land Use Policy, which emphasizes private property rights and development as necessary for economic vitality. Lincoln County does have a wind energy ordinance, which I discuss below, but transmission lines equal to or greater than 230-kV are not covered by that ordinance.

As part of Torrance County's Goals and Objectives in the Torrance County Comprehensive Land Use Plan, the potential for wind and solar generated power is encouraged to be investigated in order to improve and expand Torrance County-wide infrastructure to enhance the quality of life and support economic development.

The Torrance County Zoning Ordinance encourages the development of businesses that harness wind energy. The Special Use District ("SUD") permitting process for wind energy facilities are to foster the development of the County's wind power resources while preserving traditional land uses. As indicated in the Torrance County Zoning Ordinance,

wind energy facilities within a special use district are subject to a Wind Energy Facility Permit if the County Commission approves a special use district for a Wind Energy Facility. The Wind Energy Facility Permit specifies additional conditions that apply to the Wind Energy Facility.

Because the Corona Wind Projects may use up to approximately 35,000 acres of state trust land, certain of the Wind Project Companies have submitted applications for leases to the SLO and will submit additional applications in the near future. The SLO's business leasing regulations, 19.2.9 NMAC, apply to leasing of state trust lands.

Q. IN SUMMARY, WILL THE CORONA GEN-TIE SYSTEM COMPLY WITH EXISTING STATE, COUNTY, OR MUNICIPAL LAND USE STATUTORY OR ADMINISTRATIVE REGULATION?

A. Yes. As demonstrated in my testimony and exhibits, both the Corona Gen-Tie System and the Corona Wind Projects will comply with applicable state and county land use statutes and administrative regulations. There are no municipal land use regulations that apply to the Corona Wind Projects. Lincoln County enacted Ordinance No. 2017-04, an ordinance providing for the placement, construction, use and modification of Wind Energy Conversion Systems ("WECS") consistent with Lincoln County's land use policies; minimizing potential negative impacts of wind energy conversion systems. This Ordinance governs WECS or parts thereof located within the boundaries of Lincoln County, including privately owned land or land owned by the State of New Mexico or the United States. Torrance County encourages the development of businesses that harness wind energy and has SUD permitting process to foster the development of the Torrance County's wind power resources while preserving traditional land uses. The SLO will apply its leasing

regulations to issue the real estate lease with which the Corona Wind Projects will comply if a SLO lease is granted and utilized.

Q. DOES THIS CONCLUDE YOUR TESTIMONY AT THIS TIME?

A. Yes, it does.

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF THE CORONA WIND COMPANIES' JOINT APPLICATION FOR THE LOCATION OF THE CORONA WIND PROJECTS AND THE CORONA GEN-TIE SYSTEM IN LINCOLN, TORRANCE AND GUADALUPE COUNTIES PURSUANT TO THE PUBLIC UTILITY ACT, NMSA 1978, §62-9-3	)	Case No. 18-_____
ANCHO WIND LLC, COWBOY MESA LLC, DURAN MESA LLC, RED CLOUD WIND LLC, TECOLOTE WIND LLC, VIENTO LOCO LLC,	)	
JOINT APPLICANTS.	)	

EXHIBIT CK-1

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&XUUHQW &RQGLWLRQV DQG ±&RUUHQW *5HJLRQD
7LH 6WXG\ &RUULGRU
&XUUHQW &RQGLWLRQV DQG ±&RUUHQW 5HJLRQD
:LQG 3URMHFW $UHD

(19,5210(17$/ ())(&7
,QWURGXFWLRQ
$LU 5HVRXUFHV
,PSDFW $VVHVVPHQW 0HWKRGV
,PSDFWV 6SHFLILF 7LHW6WXG\&RUULGRU
3URWHFWLRQ 0HDVXUHV
&RQFOXVLRQ
1RLVH
,PSDFW $VVHVVPHQW 0HWKRGV
,PSDFWV 6SHFLILF 7LHW6WXG\&RUULGRU
3URWHFWLRQ 0HDVXUHV
&RQFOXVLRQ
*HRORJ\ DQG 0LQHUDO 5HVRXUFHV
,PSDFW $VVHVVPHQW 0HWKRGV

,PSDFWV 6SHFLILF WR WKH &RQVWUXFWLRQ DQG /RQJ7HUP 2SHUDWLRQ
3RWHQWLDO 0HDVXUHV
&RQFOXVLRQ
6RLO 5HVRXUFHV
,PSDFW $VVHVVPHQW 0HWKRGV
,PSDFWV 6SHFLILF WR WKH &RQVWUXFWLRQ DQG /RQJ7HUP 2SHUDWLRQ
3URWHFWLRQ 0HDVXUHV
&RQFOXVLRQ
3DOHRQWRORJLFDO 5HVRXUFHV
,PSDFW $VVHVVPHQW 0HWKRGV
,PSDFWV 6SHFLILF WR WKH &RQVWUXFWLRQ DQG /RQJ7HUP 2SHUDWLRQ
3URWHFWLRQ 0HDVXUHV
&RQFOXVLRQ
:DWHU 5HVRXUFHV
0HWKRGV DQG ,PSDFW 7\SHV
,PSDFWV 6SHFLILF WR WKH &RQVWUXFWLRQ DQG /RQJ7HUP 2SHUDWLRQ
3URWHFWLRQ 0HDVXUHV
&RQFOXVLRQ
)ORUD DQG)DXQD
0HWKRGV DQG ,PSDFW 7\SHV
,PSDFWV 6SHFLILF WR WKH &RQVWUXFWLRQ DQG /RQJ7HUP 2SHUDWLRQ
3URWHFWLRQ 0HDVXUHV
&RQFOXVLRQ
&XOWXUDO +LVWRULF DQG $UFKDHRORJLFDO 5HVR
0HWKRGV DQG ,PSDFW 7\SHV
,PSDFWV 6SHFLILF WR WKH &RQVWUXFWLRQ DQG /RQJ7HUP 2SHUDWLRQ
3URWHFWLRQ 0HDVXUHV
&RQFOXVLRQ
5HOLJLRXV DQG &HPHWHU\ 6LWHV
0HWKRGV DQG ,PSDFW 7\SHV
,PSDFWV 6SHFLILF WR WKH &RQVWUXFWLRQ DQG /RQJ7HUP 2SHUDWLRQ
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&RQFOXVLRQ
9LVXDO DQG 6FHQLF 5HVRXUFHV
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,PSDFWV 6SHFLILF WR WKH &RQVWUXFWLRQ DQG /RQJ7HUP 2SHUDWLRQ
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/DQG 8VH ,QFOXGLQJ)DUP 5DQJH DQG 5HFUHDWL
,PSDFW $VVHVVPHQW 0HWKRGV
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&RQFOXVLRQ
6RFLR HFRQRPLFV
,PSDFW $VVHVVPHQW 0HWKRGV
,PSDFWV 6SHFLILF WR WKH &RQVWUXFWLRQ DQG /RQJ7HUP 2SHUDWLRQ

3URWHFWLRQ 0HDVXUHV
&RQFOXVLRQ
&RPPXQLFDWLRQ 6LJQDOV
,PSDFW $VVHVVPHQW 0HWKRGV
,PSDFWV 6SHFLILF WR WKH &RURQD*HQ
3URWHFWLRQ 0HDVXUHV
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5DGLDFWLYH :DVWH DQG 5DGLDWLRQ +D]DUGV
+D]DUGRXV 0DWHULDOV
,PSDFW $VVHVVPHQW 0HWKRGV
,PSDFWV 6SHFLILF WR WKH &RURQD*HQ
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3URWHFWLRQ 0HDVXUHV
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,PSDFWV 6SHFLILF WR WKH &RURQD*HQ
3URWHFWLRQ 0HDVXUHV
&RQFOXVLRQ

&21&/86,21 $1' &2,1 $7,21
/LVW RI 3UHSDUHUV DQG 5HYLHZHUV
3DWWHUQ 'HYHORSPHQW
%XUQV 0F'RQQHOO
7HFKQLFDO 5HSRUWV &RQWULEXWLQJ WR WKH (QYL
5HFLSLHQWV RI WKH (QYLURQPHQWDO 5HSRUW

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3DJH 1R

7DEOH /LQFROQ &RXQW\ 6RLO &RYHUDJH 7\SHV
7DEOH 7RUUDQFH &RXQW\ 6RLO &RYHUDJH 7\SHV
7DEOH /LQFROQ &RXQW\ 6RLO &RYHUDJH 7\SHV
7DEOH 7RUUDQFH &RXQW\ 6RLO &RYHUDJH 7\SHV
7DEOH *XDGDOXSH &RXQW\ 6RLO &RYHUDJH 7\SHV
7DEOH 1DWLRQDO /DQG &RYHU 'DWDEDVH 7\SH &RUULGRU *HQ
$FUHDJH
7DEOH &RURQD *HQ 7LH 6WXG\ &RUULGRU :HWODQG 7DEOH %DVHG
DQG :LOGOLIH 6HUYLFH 1DWLRQDO :HWODQG ,QYHQW
7DEOH &RURQD :LQG 3URMHFW $UHD :HWODQG 7DEOH %DVH
:LOGOLIH 6HUYLFH 1DWLRQDO :HWODQG ,QYHQWRU\
7DEOH 1DWLRQDO /DQG &RYHU 'DWD 6XPPDU\ IRU WKH &RUR
7DEOH)HGHUDOO\ /LVWHG 6SHFLHV &RUULGRU
7DEOH 6WDWH /LVWHG :LOGOLIH 6SHFLHV
7DEOH 6WXG\ &RXQWLHV
7DEOH DQG 1HZ 0H[LFR 3URMHFW $UHD)DUP 'HPRJUD
7DEOH /LQFROQ &RXQW\ 6RLO &RYHUDJH 7\SHV
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7DEOH *XDGDOXSH &RXQW\ 6RLO &RYHUDJH 7\SHV
7DEOH 1DWLRQDO /DQG &RYHU 'DWDEDVH 7\SH &RUULGRU
7LH 6WXG\ &RUULGRU
7DEOH 7UDQVPLVVLRQ &RUULGRU 7DEOH
%DVHG RQ WKH 8 6)LVK DQG :LOGOLIH 6HUYLFH 1DW
'DWD
7DEOH :LQG 3URMHFW $UHD &RUULGRU 7DEOH %DVHG RQ
8 6)LVK DQG :LOGOLIH 6HUYLFH 1DWLRQDO :HWODQ
7DEOH 1DWLRQDO /DQG &RYHU 'DWD 6XPPDU\ IRU WKH :LQG 3
:LQG 3URMHFW $UHD
7DEOH)HGHUDOO\ /LVWHG 6SHFLHV
7DEOH 6WDWH /LVWHG 6SHFLHV
7DEOH 6WXG\ $UHD &RXQWLHV
7DEOH DQG 1HZ 0H[LFR 3URMHFW $UHD)DU

/,67 2) (;+,%,76

([KLELW 1XPE ([KLELW 1DPH

([KLELW 3URMHFW $UHD

([KLELW $VVHVVPHQW $UHD

([KLELW 6RLOV 6XPPDU\

([KLELW 2LO *DV :HOO 6XPPDU\

([KLELW 0LQHUDO 5HVRXUFHV 0DS

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([KLELW 6XUIDFH :DWHUV

([KLELW 1DWL:HWO,DQGVWDSU\

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([KLELW %UHHGLQJ %LUG 6XUYH\ 5RXWHV

([KLELW &HPHWHULHV

([KLELW (DVHPHQW 0DS

([KLELW (OHYDWLRQ 0DS

([KLELW %RXQGDU\ 6XPPDU\

([KLELW %\ZD\V7UDLOV

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([KLELW *HQHUDO 9LFLQLW\ 0DS

([KLELW 6WDWH 3DUNV

([KLELW *$3 $QDO\VLV 3URJUDP

([KLELW &RPPXQLFDWLRQV 0DS

([KLELW 9LVXDO)OLJKW 5XOHV 0DS

/,67 2) $%%5(9,$7,21

$EEUHYLDWLR	7HUP 3KUDVH 1DPH
$&	DOWHUQDWLQJ FXUUHQW
$&65	DOXPLQXP FRQGXFWRU 6WHHO UHLQIRU
$&66	DOXPLQXP FRQGXFWRU VWHHO VXSSRU\
$3/,&	$YLDQ 3RZHU /LQH ,QWHUDFWLRQ &RPP
%&,	%DW &RQVHUYDWLRQ ,QWHUQDWLRQDO
%&5	%LUG &RQVHUYDWLRQ 5HJLRQ
%*(3$	%DOG DQG *ROGHQ (DJOH 3URWHFWLRQ $FW
%,620	%LRWD ,QIRUPDWLRQ 6\VWHP
%03V	%HVW 0DQDJHPHQW 3UDFWLFHV
%XUQV 0F'	%XUQV 0F'RQQHOO (QJLQHHULQJ &RPS
&'%*	&RPPXQLW\ 'HYHORSPHQW %ORFN *UDQ\
&)5	&RGH RI)HGHUDO 5HJXODWLRQV
&2	&DUERQ GLR[LGH
'1+	'HWHUPLQDWLRQ RI 1R +D]DUG
(3$	8 6 (QYLURQPHQWDO 3URWHFWLRQ $JH
(5	(QYLURQPHQWDO 5HSRUW
(6$	(QGDQJHUHG 6SHFLHV $FW
(7=	H[WUDWHUULWRULDO]RQH
(7=$	([WUDWHUULWRULDO =RQLQJ $XWKRULW
(7=&	([WUDWHUULWRULDO =RQLQJ &RPPLVVL
)$$	)HGHUDO $YLDWLRQ $GPLQLVWUDWLRQ

$EEUHYLDWLR	7HUP 3KUDVH 1DPH
)+:$	)HGHUDO +LJKZD\ $GPLQLVWUDWLRQ
*$3	86*6 *DS $QDO\VLV 3URJUDP
*/2	*HQHUDO /DQG 2IILFH
*57	*URVV 5HFHLSWV 7D[
,%$	,PSRUWDQW %LUG $UHDV
,3D&	,QIRUPDWLRQ 3ODQQLQJ DQG &RQVXO
,5%V	,QGXVWULDO 5HYHQXH %RQGV
NFPLO	7KRXVDQG &LUFXODU 0LO
N9	NLORYROW
0%7$	0LJUDWRU\ %LUG 7UHDW\ $FW
0:	PHJDZDWW
1(6&	1DWLRQDO (OHFWULFDO 6DIHW\ &RGH
1+'	1DWLRQDO +\GURJUDSK\ 'DWDVHW
1/&'	1DWLRQDO /DQG &RYHU 'DWDEDVH
10 &+$7	1HZ 0H[LFR &UXFLDO +DELWDW $VVHVVF
10&5,6	1HZ 0H[LFR &XOWXUDO 5HVRXUFH ,QIRU
10'*)	1HZ 0H[LFR 'HSDUWPHQW RI *DPH DQG)
10'27	1HZ 0H[LFR 'HSDUWPHQW RI 7UDQVSRUV
10(' 6:4%	1HZ 0H[LFR (QYLURQPHQW 'HSDUWPHQW
12[	&DUERQ PRQR[LGH
1:,	1DWLRQDO :HWODQGV ,QYHQWRU\
1:3	1DWLRQZLGH 3HUPLW

$EEUHYLDWLF	7HUP 3KUDVH 1DPH
2 0	RSHUDWLRQV DQG PDLQWHQDQFH
2+:0	RUGLQDZDWHUKPDUN
23*:	RSWLF JURXQG ZLUH
3,/27V	SURYLGH SD\PHQWVWLQ[HV
3/-9	3OD\D /DNHV -RLQW 9HQWXUH
30	SDUWLFXODWH PDWWHU
30	3DUWLFXODWH PDWWHU
33$	3RZHU 3XUFKDVH $JUHHPHQWV
52:	ULJKWZD\
6*3&+$7	6RXWKHUQ *UHDW 3ODLQV &UXFLDO +DE
6/2	6WDWH /DQG 2IILFH
63&&	6SLOO 3UHYHQWLRQ &RQWDLQPHQW D
636	6SHFLDO 3URWHFWLRQ 6\VWHP
6685*2	86'$ 6RLO 6XUYH\ *HRJUDSKLF
6:&'	6RLO DQG :DWHU &RQVHUYDWLRQ 'LVWU
6:333	6WRUPZDWHU 3ROOXWLRQ 3UHYHQWLRQ
8'3	8QDQWLFLSDWHG 'LVFRYHU\ 3URWRFRO
8'3	8QDQWLFLSDWHG 'LVFRYHU\ 3URWRFRO
86*6	8 6 *HRORJLFDO 6XUYH\
92&V	9RODWLOH RUJDQLF FRPSRXQGV
:03	:DWHU 0DQDJHPHQW 3ODQ
:2786	:DWHUV RI WKH 8 6

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7KLV UHSRUW UHVXOWV IURP WKH [ZLQG IRUHFDVW DQDO\VLV IRU WKH &RPPL
³&RPPLVVLRQHU UHSRUW LQ WKH IRUP SURYLGHG E\ WKH &RQ5RI6HF
WUDQVPLVVLRQ OLQHV DQG WKH FRVW RI GHOLYHULQJ WKH HOHFWULFLW\ SURGXFHG
PHJDZDWWV 0: RU PRUH WR GHOLYHU WKH UHTXLUHG ($V VHVVPHQW
(QYLURQPHQWDO ,PSDFW 6WDWHPHQW SXUVXDQW WR WKH 1DWLR
ORFDWLRQ RI WKH [QWUHVQVVWLVHV &RPPLVVLRQ ILQGV WKDW WKH OR
LPSRUWDQW HQYLURQPHQWDO YDOXHV

$QFKR :LQG //& &RZER\ 0HVD //& 'XUDQ 0HVD //& 5HG &ORXG 0H
DQG 9LHQWR FRRSHUDWLYH &RUSRUDWLRQ DVKLHQG´&RRSHUDWLYH
ORFDWLRQ WHUDQVPLVVLRQ OLQH DQG GQLQHFWDQFH GDWDEDVH
1HZ 0H[LFR HOHFWULFDO IDFLOLWLHV DQG WKH &RPPLVVLRQ
&RURQD7L*HQ\RWHPK 3DUWQHUV\ 52:7KH &RURQD :LQG
&RPSDQLHV LQFOXGH 3DWWHUQ (QHUJ\ *URXS /3 3DWWHUQ 'HYHORSI

7KH&RURQD7L*HQ\WHPZLOO LQWHUFRQQHFW ZLWK VHYHUDO VSHFLILF J
FRQVWUXFWLQ:J WR QDPHSODWH FDSDFLW\&RRUGLQDWHG&RQVWUXFWLO
7KH&RURQD7L*HQ\V\VWHPV RI DSSOLFDWLRQ[LFDWLRQ LQWHUFRQQHFWLRQ
DSSUR[LPDWHO\&RURQDG7L*HQ 7KH &RURQD :LQG &RPSOH[LQWHUFR
6XQ=RX6KZHVW 7UDQVPLVVLRQ 7UDQVPLVVLRQ 3URMHFW &RURQD7L*HQ
6\VWHPH 6XQ=DQVPLVVLRQ SURMHFW WR DGGUHVV WUDQVPLVVLRQ
FRUULGRU ZLWK SRVVLEOH 9FRQJHVWLRQ DQG GLU
QQH LQ 1HZ 0H[LFR&RQGXFWRU RQ WKH ILUVW SRUWLRQ RI WKH
D N9 $& WUDQVPLVVLRQ OLQH WKDW ZRXOG EH XWLOL]HG E\ WKH

7KH&RURQD7L*HQ\ZLOOHP UHTXLUH D 52: ZLGWK RI DSSUR[LPDWHO\
SULYDWH ODQG IRU ZKLFK WKH &RURQD :LQG&RPSDQLHV ZKDWKHW
XQGHUO\LQJ ODQGRZQHUV SULRU WKH &RPPHQFHPHQW&RPSDQLHV
UHTXHVWLQJ D 52: ZLGWK GHWHUPLQDWLRQ SXUVXDQW WR 1&6$
PD\ EH UHTXLUHG E\ ODZ

&RROHFWLRQ 9LQHOV FRQQHFW HDFK RI :LQGHUV WXUELQH WR HLWKHU
VXEVWDWLRQ 3URMHFW 6XEVWDWLRQ 3URMHFW

3URMHFW7KHHFROOHFWLRQ OLQHV DUH H[SHFWHG FRQGEWLERXUVLHG
EXULDO LPSODWFKRLXFJKELQHIRUR&DWLRQ DLQRGXVDWRKHZKRGHVEXVVHG
KHUHLQ WKH VXEMHFW RI WKLV&(RUYRLUDRLQHHQWXGO&5HSURUGWRU(5 L

7KLV (5 DGGUHVVHV WKH DHI[HFWHLQJHFRYLUGWLRQ IRU WKH HQYL
1HZ 0H[LFR 6WDWX106$ $QQRWHDWLHGRRPPLV5XLRQ 10$&
DQG DGGLWLRQDO UHVRXUFH DUHDV LGHQWLIKG WRVERXUFHLQW
DGGUHVVHG LQ WKLV (5 LQFOXGH DLU UHVRXUFHV LQDWHU UHVF
UHFUHDWLRQ DQG VFKRROV YLVXDO DQG VFHQLFOLXLRXVUDO
UHVRXUFHV DQG SDOHRQWRORJ\ VRLOV PLQHUDOV DQG PLQLQJ
FRPPXQLFDWLRQ VLJQDOV PLOLWDU\ DFWLYLWLHFWDQG ZDYLWHLD
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GHWHUPLQH ZKHWKHU WKH SUXSSVXEVWDWLRQPLVVDLQRQVZLQHFKVDW
³WUDQVPLVVLR´Q ZRXXHGGDXFL\OLPSLDHLU LPSRUWD´QW SQRYLURQPHQWD
106$ 6HFWLR)RQ,PSDFW HYDOXDFKLRQHVRXUFH DUH GLVFXVVHG
&RURQD7L*HHQWXG\ &RRUQHGUDJH3UHDFWLFHV %03V WKDW FDQ KH
LPSDFWV

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7KH &RURQD :LQG &RPPHUFLDO SURMHFW FRQVLVWV RI WUDQVPLVVLRQ OLQHV ZLWKLQ SURMHFW ERXQGDULHV
1HZ 0H[LFR SRZHU SURMHFW OLQHV RI WUDQVPLVVLRQ OLQHV ZLWKLQ SURMHFW ERXQGDULHV
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RQO\ UHTXLUHPHQWV DQG RWKHU UHOHYDQW LQIRUPDWLRQ

3XUSRVH DQG 1HHG

7KH SXUSRVH DQG QHHG IRU WKH SURMHFW FRQVLVWV RI WKH
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7UDQVPLVVLRQ 3URMHFW &RQVWUXFWLRQ &RVWV &RVW (VWLPDWHV &
XQGHU 3RZHU 3XUFKDVH $JUHHPHQWV 3RSXODU 3URMHFW LV EHLQJ F
ZLWK WKH JHQHUDWLRQ RI UHQHZDEOH HQHUJ\ &RQVWUXFWLRQ
RI 1HZ 0H[LFR 7[KLELW LV FRQVLVWHQW ZLWK (QHUJ\ 3ROLF\ ´,PSOHPHQ
SXUVXLW WR WKH *RYHUQRU

'HFLVLRQV WR EH 0DGH

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WKDW WKH ORFDWLRQ ZLOO XQGXO\ LPSDLU LPSRUWDQW HQYLUR
HQYLURQPHQWDO YDOXHV WKH &RPPLVVLRQ 1HZ 0H[LFR &RQVWLWXWLRQ
LVVXHG HQYLURQPHQWDO E\

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$OWHUQDWLYHV &RQVLGHUHG

7KH &RURQD :LQG &RPSDQLHV DUH SURSRVLQJ D QXPEHU RI DOWHUQDWLYHV
WKH &RUSRUDWLRQ HFWV WR DWWDLQ 36$ RZQHUVKLS RU WR EH ORFDWHG RQ
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WKLHQDO WXUELQH QXPEHUV DQG VZLWFK\DUGV EDVHG RQ W
LQWHUFRQQHFWLRQ UHTXLUHPHQWV DQG SKDVLQJ RSWLRQV 7KH
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SUDFWLFDEOH

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RSHUDWLRQ DQG PDLQWHQDQFH RI WKH 7 L*HHG WXG\ &RUULGRU
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3URMHFW WR WKH JULG 9HUL]RQ :HVW &RDVW /LQH DQG DOVR EH
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N9 IRUWHUFRQQHFWLRQ LQWR WKH 6XQ]LD 7UDQVPLVVLRQ 3URM

7UDQVPLVVLRQ /LQH

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WKDW FKDUJHG 9 7KH FROOHFWLRQ V\VWHP HQGHG DW WKH
3URMHFW SXEVWDWLRQ EWWHSSWLRQV ZKHUH L QFUHDVHG 9 WR 9 XVLQJ EOHDU
WUDQVIRUPHU&RUH :LQGHSHQGHQW FRQQHFWHG WR HDFK
N9WUDQVPLVVLRQ OLQH V ZRXOG FRQQHFW WR WKH 6XQ]LD
WRN9 VXEVWDWLRQ EWWHSSWLRQ PDGH SULRU WR FRQVWUXFWLRQ DQ
HIILFLHQFLHV WKDW UHGXFH QHHGOHVV GHPROLWLRQ DQG
WUDQVPLVVLRQ OLQH V ZRXOG FRQVLVW7KH HQWHUHQWWKDRSWLRQ OLQ
OLQH ZRXOG GHSHQG RQ ILQDO ZRUXOLQJ QH7KHGWKDRSWLRQ OLQ

6WUXFWXUHV

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PRQRSROHWRZHUBPH RDQGSKRUHHDQJOH0RWXFWXUHXUHWXUHSVZRXOGE H
KRZHYHU LQ VRPH DUHDV\HGWRFSWXRUYLGZRXGGLWHRQDO VWUXFW

UHTXLUH ORQJ VSDQV EHWZHHQ VWUXFWXUHV VXFK DV ULSDULD
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IRXQGDWLRQV PD\ EH XVHG LQ VSHFLDO GHVLJQ FDVHV GHSHQGL
WUDQVPLVVLRQ VWUXFWXUH SROHV ZRXOG EH DSSURSULDWHO\ WR IH
DQJOH WR DGMDFHQW WUDQVPLVVLRQ VWUXFWXUHV

&RQGXFWRUV DQG $VVRFLDWHG +DUGZDUH

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FRQGXFWRUV FRPS
$&66 FDEOHV RU FRQGXFWRUV RI FRPSDUDEOH FDSDFLW\ $Q $&
DOXPLQXP VWUDQGV
DERYH WKH JURXQGUDQVPLVVLRQ OLQH ZRXOG EH IHHW DW
1DWLRQDO (OHFWULFDO 6DIHW
FURVVLQJV PLQLPXP FOHDUDQFH ZRXOG W\SLFDOO\ LQFUHDVH W
VL]HG DOXPLQXP FRQGXFWRU VWHHO UHLQIRUFHG $&65 FDEOHV

)LEHU 2SWLFV

)LEHU RSWLF JURXQGZLUH
WUDQVPLVVLRQ VWUXFWXUH LQ WKH VKLHOG ZLUH 7KH RXWHU V
23*: ZRXOG EH DSSURSULDWHO\ LQFK LQ GLDPHWHU

6WHHO 6XEVWDWLRQ &RQGXLW 6\VWHP

0RUH WKDQ RQH
VWHHO VXEVWDWLRQ V ZRXOG
HTXLSPHQW FRQWURO HQFORVXUH FRQWDLQLQJ
FRPPXQLFDWLRQV HTXLSPHQW
WKH PLFURVLWLQJ DQG JHRWHFKQLTXHV
WKH VXEVWDWLRQ LV WR LQFUHDVH
WUDQVPLVVLRQ OLQHV WUDQVSRUWSWLRQ
WKH YROWDJH ZRXOG
VWHHO

VXEVWDQWLDOO\ EH ORFDWHG ZLWKLQ D IHQFHG DUHD 7KH IHQFH Z
LQGXVWU\ VWDQGDUGV WR SURYLGH VDIHW\ DQG VHFXULW\

$ VZLWFKJDUG N9 VXEVWDWLRQ EH ORFDWHG DGMDFHQW WR WKH 6DQ-DFLQWR
3URMHFW VZLWFKJDUG RU WKH QHDUHVW VXEVWDWLRQ WKDW FDQ QHFW WKH HOHFWULFLW\ WR
V\VWHP

5LJKW:D\ $FTXLVLWLRQ

52: ZLGWK IRU WUDQVPLVVLRQ OLQHV ZLOO EH HVWDEOLVKHG EHWW HDFK VLGH RI WKH WUDQVP
IRRW ZLGH 52: ZRXOG DFFRPPRGDWH WKH DQWLFLSDWHG VWUXFW
WUDQVPLVVLRQ OLQHV DQG FRQGXFWRUV DQG DOORZ IRU PDLQWHQDQFH RI WKH OLQH
VWUXFWXUHV LQ WKH 52:)LQDO GHVLJQ ZLOO GHWHUPLQH WKH
WKH WUDQVPLVVLRQ OLQH 52: WHPSRUDU\ ZRUN DUHDV DQG WHPSRUDU
WUDQVPLVVLRQ OLQH DQG VXEVWDWLRQV 6RPH SXEOLF URDG XS
WKURXJKRXW WKH 52: 7RUUDQGR &RXQW\ 5RDGV DQG 7UDQVPLVVLRQ OLQH DWH
ODQGRZQHUV 7UDQVPLVVLRQ OLQH IDFLOLWLHV RQ 52: DWH OD

$FFHVV 5RDGV

7KH &RURQD :LQG 3URMHFW ZRXOG XVH H[LVWLQJ URDGV DQG RYHUODQG WUD
RUGHU WR UHGXFH QHZ GLVWXUEDQFH 6RPH QHZ SHUPDQHQW R
UHTXLUHG WR DFFHVV VWUXFWXUH ORFDWLRQV [V ZLWKLQ 2WKHUV
UHWDLQ DFFHVV IRU PDLQWHQDQFH 3RUWLRQV RI H[LVWLQJ DFF
UHTXLUH LPSURYHPHQWV DV ZHOO DV QHZ DFFHVV URDGV WHPS
DQG RU UHGXFHG ZLGWKV DOORZHG XQGHU WKH DOLJQPHQW RU
FRQGLWLRQV ZRXOG IROORZ ODQGIRUP FRQWRXUV HGJHV DW
DOLJQPHQW GRHV QRW LPSDFW RWKHU
UHYHJHWDWHG ZLWK QDWLYH RU VLPLODU JUDVVHV DQG IRUEV I
VXEVWDQWLDO VXUIDFH SUHSDUDWLRQ DQG UHVHHGLQJ ZRXOG
FRQVLVW RI
LQ WKH IRUPHU
ODQGRZQHU $FFHVV URDGV RQ SULYDWH SURSHUW\ PD\ EH PDLQ

$OO QHZ DFFHVV WKDW LV QRW UHTXLUHG
*DWHV ZKHUH SUHVHQW RU LI LQVWDOOHG ZRXOG EH FORVHG D
ODQGRZQHU $FFHVV URDGV RQ SULYDWH SURSHUW\ PD\ EH PDLQ

/D\GRZQ 0DWHULDO6WDJLQJ

7HPSRUDU\ PDWHULDO VWDJLQJ DUHDV ZRXOG EH UHTXLUHG WR V
DVVHPEOH VWUXFWXUHV DQG WR VWRUH FRQVWUXFWLRQ PDWHULDOV
EH XS WR DFUHV LQ FORVH SUR[LPLW\ WR HDFK WRZHU DUHD
OD\GRZQ DUHDV ZRXOG EH XVHG WR VWRUH PDWHULDO DQG
SDUN YHKLFOHV DQG HTXLSPHQW DQG SRQWDEOH FRQVWUXFWLRQ
SRWHQWLDO LPSDFWV DQG HLDVXUHV 7KH VWDJLQJ DUHDV
DYRLG VXFK VHQVLWLYH DUHDV 7KH VWDJLQJ DUHDV
&RUULGRU6\VWHP

&RQVWUXFWLRQ $FWLYLWLHV

7KH SURSRVHG 6RXWK &RUULGRU6\VWHP XVH VWDQGDUG FRQVWUXFWLRQ DQG
RWKHU WUDQVPLVVLRQ SURMHFWV LQ WKH ZHVWHUQ 8QLWHG 6WDWHV
DSSURSULDWH PRQLWRULQJ DQG UHVXOWV RI LQWHUFRQQHFWLRQ V
&RUULGRU6\VWHP VFKHGXOH SURMHFWV DFWLYLW\
E\ WKH HQG RI&RUULGRU6\VWHP XVH RI
HQG RI

6HTXHQFH RI $FWLYLWLHV

7KH FRQVWUXFWLRQ LQ WKH PH[SHFWHG WR IROORZ WKH VHTXHQ
ORFDWLRQV VXUYH\LQJ DQG PDUNLQJ DFFHVV URDGV LPSURYHG RU EXLOW WR DFFHVV WRZHU
DQG SROHV IUDPHG FRQGXFWRUV WHQVLRQHG DQG VDJJHG 7KH
FRQVWUXFWLRQ DFWLYLWLHV PD\ RFFXU DW GLIIHUHQW ORFDWLRQV
UHTXLUH VHYHUDO FUHZV RSHUDWLQJ VLPXOWDQHRXVO\ DW GLII

7HPSRUDU\ OD\GRZQ PDWHULDO VWDJLQJ DUHDV ZRXOG EH
SUL YDWH ODQGV DORQJ WKH OLQH URXWH ZLWK QHJRWLDWHG DF
VHUYH DV ILHOG RIILFHV UHSRUWLQJ ORFDWLRQV IRU ZRUNHUV
WHPSRUDU\ PDWHULDO VWDJLQJ DUHDV PDWHULDOV

6XUYH\LQJ

&RQVWUXFWLRQ VXUYH\V ZRXOG EH VWDUWHG DSSUR[LPDWHO\ GDVFHUWDLQLQJ
JHRWHFKQLFDO FRQGLWLRQV IRU IRXQGDWLRQ GHVLJQ 5
ZRUN DUHDV EHIRUH DQG LQ VRPH DUHDV URDGV WR DFFHVV ZRUN

$FFHVV 5RDG &RQVWUXFWLRQ

7K&RURQD:LQG3URMHFWVZRXOG EH ORFDWHG LQ FORVH SUR[LPLW\ WR H[LVWLQJ URDGV DFFHVV WR WKH 5 2 : WKH H[WHQW SRVVLEOH 7KH FRQVWUXFWLRQ RI DFFHVV RYHUODQG WUDYHO PD\ EH UHTXLUHG WR DOORZ DFFHVV RI FRQV 7KLV PD\ LQYROYH FOHDULQJ YHJHWDWLRQ DQG FUXVKLQJ YHJHW ZKHUH FRQWRXULQJ LV QRW UHTXLUHG GLVWXUEDQFH ZRXOG EH O PLQLPL]H FKDQJHV LQ WKH RULJLQDO FRQWRXUV /DUJH URFNV D DOORZ YHKLFOH DFFHVV

(TXLSPHQW WR FRQVWUXFW WKH DFFHVV URDGV ZRXOG LQFOXGH ZRXOG EH LPSOHPHQWHG WR UHGXFH HURVLRQ DQG VHGLPHQW VWUHDPV WR WKH H[WHQW SUDFWLFDEOH ([LVWLQJ URDGV XWLOL]HG WR WKH H[WHQW SRVVLEOH DQG OHYHOHG ZKHUH QHHGHG FRQVWUXFWLRQ DQG HURVLRQ FRQWURO PHDVXUHV WHFKQLTXHV DV LQVWDOOLQJ ZDWHU EDUV DQG GLWFKHV ,Q DGGLWLRQ PHDVXUHV ZRXOG EH WDNHQ WR UHGXFH LPSDFWV ORFDWLRQV DQG DYRLGLQJ VHQVLWLYH DUHDV SHU

6WUXFWXUH +ROHV

([FDYDWLRQV IRU VWUXFWXUH KROHV ZRXOG EH PDGH ZLWK VWDQGDUG VL]HG EDFNKRH RU ODUJH H[FDYDWRU :KHUH WKH VR WUXFN PRXQWHG SRZHU DXJHU ZRXOG EH XVHG 7KH IRXQGDWLRQ H[FDYDWLRQ DFFHVV WR WKH IRXQGDWLRQ VLWHV 6WUXFWXUH KROH H[FDYDW DXJHU RU GULOO D FUDQH DQG PDWHULDO WUXFNV

6WUXFWXUH KROHV OHIW RSHQ RU XQJXDUGHG GXULQJ FRQVWUX ZKHUH SUDFWLFDO WR SURWHFW WKH SXEOLF OLYHVWRFN DQG VWRFNSLOHG DQG XVHG WR EDFNILOO WKH VWUXFWXUH KROHV

6WUXFWXUH)UDPLQJ DQG $VVHPEO\

3ROH VHFWLRQV SROH IUDPLQJ DQG DVVRFLDWHG KDUGZDUH ZR E\ WUXFN 6WUXFWXUHV PD\ EH DVVHPEOHG RIIVLWH DQG WUDQV KHOLFRSWHU ,QVXODWRU VWULQJV DQG VWULQJLQJ VKHDYHV DU ZKLOH WKH SROH LV RQ WKH JURXQG 6WULQJLQJ VKHDYHV SXOO VWULQJLQJ SURFHVV WR WKH WHQVLRQ RI WKH VWULQJV 7KH DVVHPEO SODFH E\ D FUDQH +HOLFRSWHU DVVLVWHG FRQVWUXFWLRQ PD\

&RQGXFWRU ,QVWDOODWLRQ

2QFH VWUXFWXUHV DUH LQ SODFH DURRPOVRWUXEHQWXZRXWRGVEHUSXW
WKURXJK WKH VWULQJLQJ VKHDYHV RQ HDFK LQVXODWRU $ ODU
WKH SLORW OLQH DQG VWUXQJ 7KLV LV FDOOHG WKHSDUQGLQJ C
FRQGXFWRU LV SXOOHG WKURXJK DOO LQVXODWRU VKHDYHV

&RQGXFWRU ZRXOG EH VWUXQJ XVLQJ SRZHUHG SXOOLQJ HTXLSP
HTXLSPHQW DW WKH RWKHU HQG)RU SXEOLF SURWHFWLRQ
RYHU URDGZD\V WUDQVPLVVLRQ DQG GLVWULEXWLRQ OLQHV VW
FRQVLVWDQW+SROHV WHPSRUDULO\ SODFHG RQ HLWKHU VLGH RI
ZLUH FRQGXFWRQ IRU RHTXLSPLQJ RQ DQ REVWDFOH (TXLSPHQW
DXJHUV OLQH WUXFNV SROH WUDLOHUV DQG FUDQHV*XDUG VV
RWKHU VDIHW\ PHDVXUHV VXFK DVREDUULFDGHV ZKHUH

&RQGXFWRU VSOLFLQJ ZRXOG EH UHTXLUHG DW WKH HQG RI D FR
VWULQJLQJ 7KH ZRUN ZRXOG RFFXU RQ ZRUN DUHDV IRU WKH SR

+HOLFRSWHU 8VH

$FFHVV LQ WRTXDFK VWDQXFWLRQ IRU FRQVWUXFWLRQ DFW
WR VXSSRUW FRQVWUXFWLRQ DFWLYLWLHV7LHQFXQXHEWHQ WR
SRWHQWLDOO\ IDFLOLWDWHG E\ KHOLFRSWHUV PD\ LQFOXGH

- 7UDQVSRUW RI HTXLSPHQW DQG PDWHULDOV WR WUDQVPLVV
- 7UDQVPLVVLRQ VWUXFWXUH SODFHPHQW
- +DUGZDUH LQVWDOODWLRQ
- :LUH DQG FRQGXFWRU VWULQJLQJ RSHUDWLRQV

$OO KHOLFRSWHU RSHUDWLRQV ZRXOG)EH GHFRQGXFWHG$PQDQVWHQZDWLRQ
)$$

6WHXSS 6XEVWDWLRQV DQG 6ZLWFK\DUG

)ROORZLQJ VXUYH\ DQG VWDNLQJ RI WKH VXEVWDWLRQ DQG VZLW
LQVWDOOHG DV QHFHVVDU\ 6LWH DFFHVV ZRXOG EHJHYSUHSDUHG
QHHGHG WR LQVWDOO D JUDYHO GULYHZD\ 7KH VXEVWDWLRQ D
&RQFUHWH SDGV DQG IRRWLQJ IRU HTXLSPHQW ZRXOG EH LQVWD
IHQFHG DUHD (TXLSPHQWWKZHRXOGHEHGGHJHQHUDOO\RVWRUHG LQV
VRPH PDWHULDOV PD\ QHHG WR EH VWRUHG RQ WKH SURSHUW\ R
(TXLSPHQW VXFK DV FLUFXLW EUHDNHQGW ZRXOGEHHGDQGGLQWRUD

7UDQVIRUPHUV ZRXOG EH GHOLYHUHG WR WKH VLWH DQG LQVWD
DQG GDWD DFTXLVLWLRQ HTXLSPHQW ZRXOG EH LQVWDOOHG 8SI
DUHDV RXWVLGH RI WKH EHHQ UHVWRUHG RU GHYHORSHG DV
F

&RQVWUXFWLRQ :DVWH 'LVSRVDO

&RQVWUXFWLRQ VLWHV OD\GRZQ DQG PDWHULDO VWRUDJH \DUG
FRQGLWLRQ WKURXJKRXW WKH FRQVWUXFWLRQ SHULRG &RQWUDFWRU
GLVSRVDO DQ DSSURSULDWH RQ VLWH UHF\FOLQJ RSWLRQV 2LOV DQG IX
DSSURYHG VLWH IRU GLVSRVDO 1R RSHQ EXUQLQJ RI FRQVWUXF

6LWH 5HFODPDWLRQ

:RUN VLWHV WKDW ZRXOG EH GLVWXUEHG XVLQJ H[FHVV PDWHULDOV QDWLYH RU
IRU WKDW SXUSRVH 7KH FRQWUDFWRU ZRXOG GLVSRVH RI H[FHV
PDWHULDOV WKDW FDQQRW EH XVHG LQ UHFODPDWLRQ ZRUN

'LVWXUEHG DUHDV ZLWK WKH H[FHSWLRQ RI DFFHVV URDGV ZRXOG EH
RULJLQDO FRQWRXU DQG UHVHHGHG ZKHUH DSSURSULDWH 5LSSL
URDGV RU RWKHU DUHDV ZRXOG EH GRQH WR KHOS DVVXUH WKDW
YHJHWDWLRQ GHVWUXFWLRQ ULSSLQJ PD\ QRW EH UHTXLUHG IR
FDVH EDVLV

3URWHFWLRQ RI 3ULYDWH 3URSHUWLHV DQG 5HVRXUFHV

([LVWLQJ LPSURYHPHQWV ZRXOG EH SURWHFWHG LI WKH\ DUH GDPDJHG
H[LVWLQJ URDGV ZRXOG EH OHIW LQ D FRQGLWLRQ JHQHUDOO\ H
FRQVWUXFWLRQ RI WKH WUDQVPLVVLRQ OLQHV SDVVHV WKURXJK
DUH GDPDJHG E\ FRQVWUXFWLRQ DFWLYLWLHV WR WKHLU RULJL

7HPSRUDU\ JDWHV ZRXOG EH LQVWDOOHG RQO\ ZLWK WKH SHUPL
RULJLQDOO\ FRQVWUXFWLRQ ZLWKLQ FRQVWUXFWLRQ XQOHVV RWKHUZLVH DJUHH
FORVHG DQG ORFNHG GHSHQGLQJ RQ WKH DJUHHPHQW ZLWK WK

3ULRU WR FRQVWUXFWLRQ DOO VXSHUYLVRU\ FRQVWUXFWLRQ S
HFRORJLFDO DQG FXOWXUDO UHVRXUFHV IRU WKH FRQVWUXFW
IHGHUDO VWDWH DQG ORFDO ODZV UHJDUGLQJ ZHWODQGV YHJ
LPSRUWDQW HFRORJLFDO UHVRXUFHV DQG WKH SXUSRVH DQG QHFHVVLW\ R
SURWHFWLQJ VHQVLWLYH UHVRXUFHV

$OO ZDVWH SURGXFWV LQFOXGLQJ IRRG JDUEDJH IURP FRQVWU
UHFHSWDFOH RUUUEHDPJRYZHRGXGGLEOH K*DXOHG WR D VXLWDEOH DQG
IDFLOLW\

7R UHGXFH WKH QXPEHU RI IHDWXUHV GLVWXUEHG LQ GHVLJQDWH
GXULQJ WKH HQJLQHHULQJ GHVLJQ SURFHVV WXFKR DW WRWDYRLGG OVLH
DUHDV DQG ZDWHUFRXUVHV DQG RU WR DOORZ FRQGXFWRUV WR
GHVLJQ

2SHUDWLRQ DQG 0DLQWHQDQFH

2SHUDWLRQ DQG 0DLQWHQDQFH RI WHHGHW&RRULRQFDXGHGW3KRMRHFOWRVZ

2SHUDWLRQ

$IWHU WKH FRQVWUXFWLRQ DFWLYLWLHV DUH FRPSOHWHG GHQHUJL]HG ODQG XVHV FRPSDWLEO
DFWLYLWLHV DVVRFLDWHG ZLWK RSHUDWLRQV DQG PDLQWHQDQF
52: ([LVWLQJ XVHV VXFK DV DJULFXOWXUH DQG JUD]LQJ DUH JH
,QFRPSDWLEOH ODQG XVHV LQFOXGH FRQVWUXFWLRQ RI SHUPDQ
VXUIDFH HOHYDWLRQ WKDW ZRXOG DIQHJFRU 1$6&DHQHG WDE EODWFLOH

6DIHW\ LV D SULPDU\ FRQFHUQ LQ WKH $QDQDQQLQJ GHVLJQ
SURWHFWHG ZLWK SRZHU FLUFXLW EUHDNHUV DQG GXHFWDWHG LOOX
RFFXUV SREHUDXWRPDWLFDOO\ UHPRYHG IURP WKH OLQH /LJKW
RYHUKHDG VWDWLF DQG JURXQGLQJ ZLUHV DORQJ WKH OHQJWK
FURVV RU DUH 7ZLWK2QWKHG*EOH JURXQGHGSWRSFDOY VKRN DQG
UHTXLUHPHQWV

0DLQWHQDQFH

0DLQWHQDQFH RI WKH WUDQVPLVVLRQ OLQH ZRXOG EH SHUIRUPH
QRQ HPHUJHQF\ PDLQWHQDQFH DQG UHSDLUV WKH
LPSOHPHQWHG WR WKH H[WHQW
UHTXLUHG IRU PDLQWHQDQFH DFWLYLWLHV RQ WUDQVPLVVLRQ O

(PHUJHQF\ PDLQWHQDQFH ZRXOG LQYROYH SURPSW
ZRXOG EH LQVWUXFWHG WR SURWHFW YHJHWDWLRQ ZLOGOLIH
5HFODPDWLRQ SURFHGXUHV IROORZLQJ FRPSOHWLRQ RI UHSDLU
QRUPDO FRQVWUXFWLRQ

7 U D I I L F \6 D I H W

0 L Q L P D O D G G L W L R Q [illegible] D G V L Q W K H D U H D D V
F R Q V W U X F W L R Q D Q G 2 0 [illegible] R I Y H K L F
W U D Q V P L [illegible] Z R X O G
/ L Q F R O Q [illegible] U R D G X V H / [illegible]
* X D G D O X S H [illegible] G L Q D W H G Z L W K [illegible] 0 H [L F
7 U D Q V S R U W [illegible] 5 R D G V 0 D L Q W H Q D Q F H ' H S D
H Q J L Q H H U [illegible] V S H F L I L F U R [illegible]
6 H F W L R Q

' H F R P P L V V L R Q L Q J

' H F R P P L V V [illegible] Q J R R Q D [illegible] W H U Q
' H Y H O R S P [illegible] W L R Q
3 D W W H U Q [illegible]

- Wind turbines (including towers and pad-mount transformers) [illegible]
- Tower foundations and pad mount transformer foundations [illegible]
- Overhead power and/or communication lines [illegible]
- Substations [illegible]
- Buried cables (power and/or communication) [illegible]

- O & M building : L O E H F O H D F U H G D Q H G G H P R Y H G W K H U R M H F W W W H U Q ' H Y H O R S P H Q W X W K D W W H 0 E X L O E G H L Q J V L J Q H Z G Q W H D Q H Z

- Restoration of property. 7 R W K H [W H Q W V R S U D E F W W K D E U R Q D 3: U R M H F W V L W H E H U H W X U R U H G L V W R Q G L 3 D L W R Q H U Q ' H Y H O R S W K H Q W R Z H D Y L W L H V F U H D W H G U R X D U G H O Z L W G K R S R W K H D P H V L P L W D W X Q W K H U R M H F W V L W H D Q G W R K H [W H Q W V R S U D E F W W K D E U L E F H W X U R W G K H R Q G D W H R Q K H K R O H F V D Y R L Z W H U H V G X J

$))(&7(' (19,5210(17

,QWURGXFWLRQ

7KH DIIHFWHG HQYLURQPHQW LV GHVFULEHG EHORZ IRU WKH HQ
6HFWLRQ0 &RPPLVVLRQ UXOH 10$& DQG DGGLWLRQDO UHV
LQWHUHVW E\ 6DLDIIUH7KRRXWHEWHRORJ\ DQG PLQHUDOWHUHVRXUFHV
UHVRXUFH DQG FXOWXUDO DQG KLVWRULFDO UHVRXUFHV RUHRJLJRXV DQ
VRFLRHFRQRPLFV DQG HQYLURQPHQWDO MXVWLFH FRPPXQLFDW
KD]DUGV KD]DURXV PDWHULDOV VDIHW\ JHRJUDSKLF UHVRXU
7KH &LVVLRQ IRU HDFK UHVRXUFH LQFOXGHV GDWD VRXUFHV XVH
ZLWKLQ WKH 7*HQHUDWLQJ &RQWH[W DQG RXWOLQHV WKH 3URMHFW
3URMHFW SKDVHV LQFOXGHG LQ WKH &RQWH[W RI 7*HQHUDWLQJ RI
WUDQVPLVVLRQ IDFLOLWLHV ZLOO EH GHVFULEHG LQ DFFRUGDQFH
DV ODQGRZQHU SUHIHUHQFHV

7KLV VHFWLRQ RI WKH (5 GHVFULEHV WKH H[LVWLQJ SURFHGXUH
LV RQ WKH SURSRVHG 7UDQVPLVVLRQ OLQH DQG DGMDFHQW WUDQVPLVVLRQ OLQH WKDW
JHQHUDWLRQ V\VWHPV WR FRQQHFW WR HOHFWULF PDUNHWV 7K
WKH SDUFHO DQG LQFOXGHV WKH 3URSRVHG :WKH WUDQVPLVVLRQ OLQH DQG DVVRF
DUHDV RI LQWHUFRQQHFWLRQ VXEVWDWLRQV DQG DFFHVV URD
FDOOHG &RUQRWKHU*HQHUDWLQJ &7RKLV LV VKRZQ DQG QDPHG ([KLELW WR SURYL
DGGLWLRQDO FRQWH[W WKLV VHFWLRQ DOVR SUHVHQWV WKH H
DIIHFWHG E\ WKH ZLQG7KLHQHUDWLRQFRQVWUXFWLRQ&RUQRWKHU:QQLG3URMHFW
$UHDQG RVVDXHQ LQ ([KLELW

$LU 5HVRXUFHV

'DWD 6RXUFHV

7KH IROORZLQJ GDWD VRXUFHV ZHUH UHYLHZHGLWRGHWHUPLQH WKH
7RUUDQFH DQ&RXQW*HQHUDWLQJ &RUQHUSURMHFW
$UHD

1RWH WKDW WR WKH H[WHQW WKDW UHVRXUFH DYDLODELOLW\ FRQVWUDLQWV
WUDQVPLVVLRQ FRUULGRU VXFK FKDQJHV ZRXOG3URMHFW$UHDQG ZLWK

- 1HZ 0H[LFR (QYLURQPHQWDO $LU 4XDOLW\ 5HJXODWLRQV
  'HFHPEHU KWWSV ZZZ HQYDOPLFKRUJ QP JRY DLUQRUWV QP RUN
- 8 6 (QYLURQPHQWDO 3URWHFWLRQ $JHQF\ 6WDWH (3$ IURP
  KWWSV ZZZ HSD JRY QP

&XUUHQW &RQGLWLRQV DQG 7UHQGV RI*HQHUDO 2YHU
6WXG\ &RUULGRU

$LU TXDOLW\ FRQGLWLRQV 7RUUDQFH &RXQW\ LV FKDUDFWHULVWLF RI SRSXODW*HQHUDWXG\L&RUULGR
ORFDWHG LV JHQHUDOO\ FRQVLGHUHG F\FOLFDO LQ WHUPV RI WHPSHUDWXUH DQG
0H[LFR (QYLURQPHQW'HSDUWPHQW %LXQHRDUGUDQ UHSRUWV WKDW
*XDGDOXSH&RXQW\ LV PHQWLRQHG DV WKH QHDUHVW PRQLWRULQJ VWDWLRQ
DWWDLQPHQW VWDWXV LV UHIOHFWLYH RI ORZ SRSXODWLRQ GHQ
7RUUDQFH DQG&RXQW\ DUH QRW LQFOXGHG LQ WKH 6RXWKZHVW 0HWURSROLWDQ
(3$ IRU DLU TXDOLW\ LQGH[VFRUHV OHYHOV RI RJRQH DQG
LQGLFDWLYH RI JRRG UHJLRQDO DLU TXDOLW\ DERYH WKH QDWL

&XUUHQW &RQGLWLRQV DQG 7UHQGV:RQGLWLRQDO 2YHU
3URMHFW $UHD

1R XQLTXH EHQGLWLRQV DUH NQR&ZRQUWRDR:FLQGU 3ROOXWDQWV
FRQGLWLRQ&RZLRQKLQ WKH&URRXQHGFWH$VHDLODU WHRZKHQRUVQGHVF
7RUUDQFH DQ&RXQWHG WKHVH SRQ ORZ SRSXODWLRQ GHQVLW\ DQG O

1RLVH

'DWD 6RXUFHV

7KH IROORZLQJ GDWD VRXUFHV ZHUH UHYLHZHG WR GHVFULEH WKH
DQG *XDGDOXSH&RXQW\ &RUULGRU 7L*HQHUDO &RQG\ &RUULGRU :LQG 3URMHFW $U

- 8 6 &HQVXV %XUHDX 'HFHQQLDO &HQVXV GDWD IURP
  KWWSV ZZZ FHQVXV JRY TXLFNIDFWV IDFW WDEOH 86 367
- /LQFROQ &RXQW\ &RPSUHKHQVLYH 3ODQ //&
- &RPPUHKHQVLYH /DQG8VH3ODQ 2UGLQDQFH\

&XUUHQW &RQGLWLRQV DQG 7UHQGV&RUR5QHDJ*HQHUDO 2YHU
6WXG\ &RUULGRU

/LQFROQ 7RUUDQF&RXQWLHV DQG WKH XSSHU &RORUDGR SRSXODWLRQ GHQVLW\ EHORZ WKH RYHUDOO SRSXODWLRQ GHQVLW\ EHORZ WKH RYHUDOO DPELHQW QRLVH OHYHOV GXH WR WKH VSDUVH QDWXUH RI WKH UHJLRQ 1RLVH OHYHOV DUH JHQHUDOO\ KLJKHVW GXULQJ WKH VXPPHU PRQWKV IURP YHU\ TXLHW ZLWK QR PXQLFLSDO RU LQGXVWULDO DFWLYLWLHV WR KLJKZD\ FURVVLQJV DQG LQ DJULFXOWXUDO DUHDV GXULQJ FXO E\ DLUFUDIW WKURXJKRXW WKH DFH

&XUUHQW &RQGLWLRQV DQG 7UHQGV&RUR5QHDQG 2YHU
3URMHFW \UHD

1RXQLTQXRHLVHQEVWRFFXU ZLWKLQ WKH 31RRLZHHFWWLWKRQD :LQG 3URMHFW
:LQG 3URMHFW XVHRIWKH WHUP FDLEERHPRQD 7L*HG WXG\
&RUULGRU GHVFULEHV RSXODWLRQ GHQVLWLHV DQG RWKHU VLJQLILFDQW KXPDQ

*HRORJ\ DQG 0LQHUDO 5HVRXUFHV

'DWD 6RXUFHV

7KH OORZLQJ GDWD VRXUFHV ZHUH UHYLHZHG WR REWDLQ JHRORJLF DQG RLOLQHFURDQQ UHVRX
7RUUDQFH DQ&RXQW\ GHKRUXSQHG7L*HG WXG\ D&RG&RKHR QD3UHFW
\UHD

- %URDGKHDG 5) 6XEVXUIDFH JHRORJ\ DQG RLO DQG JD
  0H[LF1RZ 0H[LFR %XUHDX RI *HRORJ\ DQG 0LQHUV6HUYLFH5HVRX1UHZ
  0H[LFR
- 3UHOLPLQDU\ *HRWHFKQLFDO :(QJLQHHULQJ3HUIRUPHG5HSRUW6XUQ]L
  (QJLQHHULQJ &RPSDQ\ 2FWREHU
- 7KH 'ULOOLQ*JXLGDOXSH /LQFROQ&RXQW\ 7H[HZDWHUFHUWLILFDWH
  'HFHPEHUURKPWWSV WKHGULOOHUHLQFJRV FRP XVD QHZ

&XUUHQW &RQGLWLRQV DQ2G7UHQGVZRU5QHDJ*HQHUDO
6WXG\ &RUULGRU

7KH&RUQD :LQG3RZHU&RPSOH[HV3URSRVHG3DWDSLQ\WLRJUDSKZKHSURYLQF
VLJQLJDWWXOGHHSRWLKWH3DWDLQ2JLOVWDWHEDVLQ DQG WKH3DWDLQ5HURYGHG
DZDL\QWKHUH E\ W5KLMF3KHFRXODQGVWDSHOHGEWRXQWRN[LVWHQW

V RR LYOEJUHQ WOOR SELHQGJUVRXFN,DQSHDWKHUHPQWDOOD\RXQDUHW
VHGLP7KQEWVGULRWFVHOI LV PRVWHG8HLQWKDWGHRSRLQWK
RFHDQF RQWLQHQWWKHWHVKHQGQV,QWKHSDUWKHRPH
KLJKOZDLQWRURHLVQHLRXWUXRVELYH

,Q JHQDHUDLDHLQGY HVWFLRJDGXLFRQHG E\ %DUU (HQJHLQHDWKQDH&RPSDQ\
RMVRLO RYWHHGGLUQRXFN,DQSHDFHUDWKPQWDO)RUPDWHRQVDLQV
YDU\LQJ SURRVDRQUGVDLYHQV VLOW FO\RXQDUHGVHFGOVHKQHGUQF N
JHQHUDQVRLWHVGLPHUQWDUVDQGVWRQH DQGGHOVRWWWRQH
DUHDLVQHERXGUEFKNRZHWHQFRXQWHUHKGSKFUURQWRRUQDGUMHFW
\$UHDQ PRVDZHFDWHEWHGHUXGQZDVE VHUYHGLEHWOWRZKLZKV
XQGHEOPRUFRPSHWQWLEDUMVDWXQHVRSLYRGJZHVUHQFRXQWHUHG D
RQJHRWHEKRQLFDJOORQGGVRXQLWKRUHGKRPHU ,QFDGWRSRDSKLF
GHSUHRVLXRQLVFLDO NZDHURHVHQDMVHQQXPEHUHURFDVFLRQWKRURQDG
3URMHFWSHFWSHFLILFQHRLOWDKQGUQRWKHDYWVHUQ

7KHUH DUH QR LGHQWLILHG K\GURLRFHDUERQ FDPSWGDFORLQ WDKFWLYLW

&XUUHQW &RQGLWLRQV DQG 7UHQGVRQHDL:RQGO 2YHU
3URMHFW \$UHD
*HRORJLFDO FR&RUWRQ:LQRU3WKHWKW \WDHE DV SUHYLRXVO\ GH
&RURQDL*HGWXG\ &RUULGRU

7KHDUHH FXUUHQWO\ RLO QDWXUDO JDV OHDVH7KLQ /LQFROQ
'ULOOLQJV0RVW RI WKHVH OHDVHV DUH WR VXSSRUW H[SORUDWL
KRZHYHU WKHUH DUH QR PDMRUFRXQWDQQ7RUXUDQF&RE QWLQ
H[SORUDWZRQ 'ULOOLQJ OHLQ6XPH RI WKH H[SORUDWLRQ ZHOOV KDYH
GHSRVLWV LQ WKH (VWDQFLD %RVQ DL:LQG3QRWEWKHSQGSRUWLF
KRZHHY WKHVH GHSRVLWV KDYH \HW WR EH H[SORLWHG *XDGDO
7KH 'ULOOLQJ0RVW DUH ORFDWHGRWQWKHQGRBUWKHDF
LQ WKH 7XFXPFDUL %DVLQ 7K[SORUDWLRQUDFWLYLWLHV0QLRQZLQG
3URMHFWW\KSLEHLDW

0LQLQJ KDV DOZD\V EHHQ LPSRUWDQW WR WKH HFRQRPLHV RI W
PLQHUDO GHSRVLWV EHLQJ OLPLWHG RU WKW\KHL[WRWKHRQ
3URMHFWKWDYSHUEDHQ VKXW GRZQ /LQFROQ &RXQW\ KDV KDG U

VLOYHU FRSSHU DQG IOXRULQH EXW R7QKH 'ULRIOLQ&HRXQW\ HDUHDV F
&RXQW\ KDV KDGHUHG HFRQRPLF H[WUDFWLQJ LURQ SRWDVVLXP XU
PLQHV DUH FXUUHQWOLO\ DFWLYH DOXSH &RXQW\ KDG UHJLV
FRSSHU FDOFLXP XUDQLXP J\SVXP DQGXQDQ DKGLYHP EEHXWQ DVKOXW
7KH 'ULOOLQJ,QV LV WR EH QRWHG WKDW WKH DUHDV DURXQG WKI
FRQWDPLQDWHG VRLOV RULJLQDWLQJ IURP H[WUDFWLRQ DQG SU

6RLO 5HVRXUFHV

'DWD 6RXUFHV

7KH IROORZLQJ6DHDGWDHWDHVZRXG WR DVVHVV WK/HQHFRVQLQ7JRURDQ EHV
*XDGDO&RXSHWWKHRUQD7L*HQWXG\ &RQG&KRQD :LQG 3URMHFW $UHD

- 86'$ 6RLO 6XUYH\6*HRJDSKLF DWDEDVH IRU 1H$ZFOHVLFHG
  'HFHPEHUURKPWWS DSSV FHL SVX HGX VRLOWRRO

&XUUHQW &RQGLWLRQV DQG 7UHQGV IRU&RQWDL*HQQDO 2YHU

6WXG\ &RUULGRU

7KH VRLOV DW WKH VLWH YKDYHOOSHZWHQWRGHUDWHO\KUQLQVXDO
ORJJLQJ DQG VOD EURTKDKORRO\WKHRO\WKHQRXEHVXPPDUL]H WKH H[LVWLQJ
UHVRXUFHV ORR&RWRQG7L*HWKWQGWKRHUDFKG&RXQW\ DUHD ZKHUH WK
0QH RI&RXUDV YLVXDO UHSUHVHQWDWLR&RRUWKHHQRXG\ &RRUDWG
UHIHUHQFHV WR&KRUQD7L*HQWXG\G&RRUUHVSRQG LQWR *XDGDO
H[LVWLQJ VRLO UHVRXUFHV ZLWKLQ WKLV UHJLRQ DUH QRW VKR

7DEOH /LQFROQ &RXQW\ 6RLO &RYHUDJH 7\SHV

6RLO 7\SH	$FUHV
&OR\YDOWH\ DVVRFLDWLRQ ORDP VXUIDFH JHQ	
'DUY$HVSDUDV DVVRFLDWLRQ JHQWO\ VORSLQJ	
'DUY3HDVWXUD DVVRFLDWLRQ JHQWO\ VORSLQJ	
0RNL6DWUR5XSFN RXWFURS DVVRFLDWLRQ YHU\ V	
3HQ+DJDHUR DKVRFLDWLRQ	
3HQLV7WDYHDVVLOOD DVVRFLDWLRQ JHQWO\ VO	
3OD'HR[LFH DVVRFLDWLRQ JHQWO\ VORSLQJ	
3OD'HR[LFH ORDPV WR SHUFHQW VORSHV	
5HYHG6WRQVRQ DVVRFLDWLRQ JHQWO\ VORSLQ	

5RFN RXGWFUURPSHD DVVRFLDWLRQHSH[WUHPHO\	
6DPSVRQ ORDP WR SHUFHQW VORSHV	
6WURQJO\ DVVRFLDWLRQ PRGHUDWHO\ VWHHS	

6RXUFH 86'$ 6RLO 6XUYH\ *HRJUDSKLF 6685*2 'DWDEDVH IRU 1HZ 0H[L

7DEOH 7RUUDQFH &RXQW\ 6RLO &RYHUDJH 7\SHV

6RLO 7\SH	$FUHV
%HUWUDQGY HVVLOOD ILQH VDQG\ ORDPV	
&ORYLV ORDP WR SHUFHQW VORSHV	
+DUYHOD ORDPV WR SHUFHQW VORSHV	
.LP2WH3UDV WXUD FRPSOH[	
.LP3DVW7XUSD ORDPV	
/DSRUWH5RFN RXWFURSSH[	
2WHUR DQG 3DOPD VRLOV	
3DVWXUD ORDP WR SHUFHQW VORSHV	
3HQLVWDMD ILQH VDQG\ ORDP WR SHUFHQW	
3HQLVWDMD ORDP\ ILQH VDQG KXPPRFN\ WR	
3HQLVWDMD VDQG\ FOD\ ORDP WR SHUFHQW	
3HQLVHWDQDM DLQH VDQG\ ORDPV WR SHUFHQW	
3LQRQ FKDQQHU\ ORDP WR SHUFHQW VORS	
6WRQ\ VWHHS ODQG	
7DS'HDQ ORDPV WR SHUFHQW VORSHV	
:LOODUG ORDP VWURQJO\ VDOLQH	

6RXUFH 86'$ 6RLO 6XUYH\ *HRJUDSKLF 1HZ 0H[LFR 'DWDED

&XUUHQW &RQGLWLRQV DQG 7UHQGV RI 1HDUE\ 2YHU

3URMHFW $UHD

7DEOHWKURXJKRXWKWXPPDUL]H WKH H[LVWLQJ VRLO&RQGLWLRQV ORFD

3URMHFWWHSDUFHODFFRXQWDQWV YLVXDO UHSUHVHQWDWLRQ&RQGLWLRQV

3URMHFWWHSHUHQLDO[HUDWHU

7DEOH /LQH&RXQW\ 6RLO &RYHUDJH 7\SH

6RLO 7\SH	$FUHV
&ORYDOOH\VRFLDWLRQ ORDP VXUIDFH JHQWO\	
&ORYDVWXUD DVVRFLDWLRQ JHQWO\ VORSLQJ	
'DUYHSDUDV DVVRFLDWLRQ JHQWO\ VORSLQJ	

6RLO 7\SH	$FUHV
'DUY3HDVWXUD DVVRFLDWLRQ JHQWO\ VORSLQJ	
'HDP3DDVWXUD DVVRFLDWLRQ PRGHUDWHO\ VOR	
0RNL6DWUF5RSFN RXWFURS DVVRFLDWLRQ YHU\ V	
3DVWXUD ORDP JHQWO\ VORSLQJ	
3DVW-XUDYH\ DVVRFLDWLRQ PRGHUDWHO\ UROO	
3DVW3XUDWL DVVRFLDWLRQ JHQWO\ VORSLQJ	
3HQ-DJDHUR DVVRFLDWLRQ KLOO\	
3HQLV7WDDYHDVVLOOD DVVRFLDWLRQ JHQWO\ VOR	
3OD'IR[LFH DVVRFLDWLRQ JHQWO\ VORSLQJ	
3OD'IR[LFH ORDPV WR SHUFHQW VORSHV	
3OD3HQLVWDMD DVVRFLDWLRQ JHQWO\ VORSLQ	
5DQ7DQEDUN VLOW ORDPV WR SHUFHQW VO	
5HYHG6WRSVRQ DVVRFLDWLRQ JHQWO\ VORSLQ	
5RFN RX6WFURSH DVVRFLDWLRQ H[WUHPHO\ V	
6KDUSV VLOW ORDP WR SHUFHQW VORSHV	
6KDU5RFN RXWFURS DVVRFLDWLRQ PRGHUDWHO	
6WURXWV6W DVVRFLDWLRQ 1RW'LDJQRVWLF\ VWHHS	
7DQE7DUNWXJDV DVVRFLDWLRQ YHU\ VWHHS	
7RUW$VSDU5RFN RXWFURS DVVRFLDWLRQ PRGHU	
7RUW5XJHDN RXWFURS DVVRFLDWLRQ H[WUHPHO	
7RUW5XJHDN RXWFURS DVVRFLDWLRQ PRGHUDWH	

6RXUFH6HH$ 6RLO 6XUYH\ *HRJUDSKLF 6685*2 'DWDEDVH IRU 1HZ 0H[LFR

7DEOH 7RUUDQFH &RXQW\ 6RLO &RYHUDJH 7\SH

6RLO 7\SH	$FUHV
%HUZDDY HVVLOOD ILQH VDQG\ ORDPV	
&KLOWRQ)RFRPSOH[WR SHUFHQW VORSHV	
&ORYLV ORDP WR SHUFHQW VORSHV	
'HDQ ORDP WR SHUFHQW VORSHV	
+DUYH\ ORDP WR SHUFHQW VORSHV	
+DUYHDQ ORDPV WR SHUFHQW VORSHV	
.LP2WH3DRVWXUD FRPSOH[	
.LP3DVW2USDD ORDPV	
/D)RQGD ORDP WR SHUFHQW VORSHV	
/D)RQ5RFN RXWFURS FRPSOH[	

6RLO 7\SH	$FUHV
/DSRUWH 5RFN RXWFURS FRPSOH[	
0DQ]DQR ORDP VDOLQH VXEVWUDWXP WR S	
2WHUR DQG 3DOPD VRLOV	
3DVWXUD OSHUF HQWR VORSHV	
3HQLVWDMD ILQH VDQG\ ORDP WR SHUFHQW	
3HQLVWDMD ORDP\ ILQH VDQG KXPPRFN\ WR	
3HQLVWDMD VDQG\ FOD\ ORDP WR SHUFHQW	
3HQLVWDMD 'HDQ FRPSOH[WR SHUFHQW VORSHV	
3HQLVWDMD 'HDQ ILQH VDQG\ ORDPV WR SHUFHQW	
3LQRQ FKDQQHU\ ORDP WR SHUFHQW VORS	
3UHZLWW DQG 0DQ]DQR VRLOV	
5DQF\H 5VXP ODQG FRPSOH[	
5RFN RXWFURS 3LQHQ RQGD FRPSOH[	
6WHHS URFN ODQG	
7DSOR ORDP WR SHUFHQW VORSHV	
7DSLHD 'HDQ ORDPV WR SHUFHQW VORSHV	

6RXUFH 8FH$ 6RLO 6XUYH\ *HRJUDSKLF 6685*2 'DWDEDVH IRU 1HZ 0H[LFR

7DEOH *XDGDOXSH &RXQW\ 6RLO &RYHUDJH 7\SHV

6RLO 7\SH	$FUHV
&DUGHQDV 3DOPD ORDP\ ILQH VDQGV WR SHUFHQ	
&ORYLV ILQH VDQG\ ORDP WR SHUFHQW VO	
&ORYLV 3DVWXUD DVVRFLDWLRQ WR SHUFHQW V	
+DUYHU 'HUYH\ FRPSOH[WR SHUFHQW VORSHV	
+DUYHU 'HDQ ORDPV WR SHUFHQW VORSHV	
3DOPD ILQH VDQG\ ORDP WR SHUFHQW VOR	
3DVWXUD ORDP WR SHUFHQW VORSHV	
3DVWXUD &ORYLV DVVRFLDWLRQ WR SHUFHQW VO	
3DVWXUD +DUYH\ DVVRFLDWLRQ WR SHUFHQW VO	
3DVWXUD 6LOYHU DOGRQ FRPSOH[WR SHUFHQW V	
:DWHU	
:LQRQD *DEDOGRQ FRPSOH[WR SHUFHQW VOR	
:LQRQD 5RFN RXWFURS FRPSOH[WR SHUFHQW	

6RXUFH 8FH$ 6RLO 6XUYH\ *HRJUDSKLF 6685*2 'DWDEDVH IRU 1HZ 0H[LFR

3DOHRQWRORJLFDO 5HVRXUFHV

'DWD 6RXUFHV

7KH [illegible] 7RUUDQFH [illegible] 3URM [illegible]

- $QGHUVRQ 2 - -RQHV * ([illegible] *HRORJLFDO [illegible] KWWS SXEV HU XVJV JRY SXEOLFDWLRQV RIU
- /XFDV 6 * 7KH &KLQOH *URXS UHYLVHG VWUDWLJUDSK 1RQPDULQH VWUDWD LQ [illegible]

&XUUHQW &RQGLWLRQV DQG 7UH [illegible] 2YHU 6WXG\ &RUULGRU

1R IRUPDO SDOHRQWRORJLFDO [illegible] LQ WKH DUHD FRQVLVWV RI 3HUPLDQ GHSRVLWV RI WKH 6DQ $QG)RUPDWLRQ DQG $UWHVLD [illegible] SDOHRQWRORJLFDO [illegible] DUH IURP WKH [illegible] SHULRG WKH RULJLQDO GHSRVLWV VDQGVWRQH DQG [illegible] RI URFNV WKDW [illegible] 7KH WKDW DUH UHFRYHUHG IURP WKH 3HUPLDQ [illegible] ZKLFK DUH IRXQG LQ WK [illegible] OLPHVWRQH WKDW FUHDWH D NDUVW ODQGVFDSH ZKLFK FRXOG -DFN 3HDN LQ /LQ [illegible] SRWKROHV ZLWKLQ [illegible] 0H[LFR KDYH EHHQ NQRZQ WR FRQWDLQ ERQHV [illegible] ZKLFK PD\ RFFXU GXULQJ FRQVWUXFWLRQ ZRXOG EH PDQDJHG W 8'3

&XUUHQW &RQGLWLRQV DQG 7UH [illegible] 2YHU 3URMHFW $UHD

7K [illegible] &RURQD [illegible] 0DQFRV 6KDOH DQG &KLQ [illegible] 0DQFRV 6KDO

FRQWDLQ PDULQH LQYHUWHEUDWHV DQG LQFOXGHV NQRZQ WR FRQWDLQ DERXQGV RI VLOLFLILHG ZRRG /XFDV

:DWHU 5HVRXUFHV

'DWD 6RXUFHV

7KH IROORZLQJ GDWD VRXUFHV ZHUH UHYLHZHG WR GHVFULEH WKH H[LVWLQJ DQG *XDGDOXSH &RXQW\ &RQGLWLRQV LQ WKH :LQG 3URMHFW $U

- 1DWLRQDO /DQG &RYHU GDWD &'/&W] - $ <DQJ / 'DQLHOVRQ 3 ;LDQ * &RXOVWRQ - +HURG 1 ' :LFNK &RPSOHWLRQ RI WKH 1DWLRQDO /DQG &RYHU 'DWDEDVH 5HSUHVHQWLQJ D GHFDGH RI ODQG FRYHU FKDQJH LQ WKH FRQWHUPLQRXV 8QLWHG 6WDWHV 5HPRWH 6HQVLQJ R S
- $QGHUVRQ 2 - -RQHV * (*DOORZD\ 5 ' 3DSS RI 1HZ 0H[LFR *HRORJLFDO 6XUYH\ 5HSRUW 'HFHPEHU IURP KWWS SXEV HU XVJV JRY SXEOLFDWLRQV RIU
- 8 6 (QYLURQPHQWDO 3URWHFWLRQ $JHQF\ (3$ LQ 1HZ 0H[LFR 5HWULHYHG KWWSV ZZZ HSD JRY QP
- 3OD\D /DNHV -RLQW 9HQWXUH 3/-9 0DSV RI 3UREDEOH $FFHVVHG 'HFHPEHU DQG 6HSWHPEHU SDUWQHUYDWHUV FRP SDSHU
-)(0$)ORRG 0DS 6HUYLFH &HQWHU $FFHVVHG 'HFHPEHU KWWSV PVF IHPD JRY SRUWDO VHDUFK
- 86):6 1DWLRQDO :HWODQGV ,QYHQWRU\ :HWODQGV GDWD PDSSHU KWPO
- 8 6)LVK DQG :LOGOLIH 6HUYLFH 86):6 %LUGV RI &RQVHUYDWLRQ 'LYLVLRQ RI 0LJUDWRU\ %LUG 0DQDJHPHQW $UOLQJWRQ 9 KWWSV ZZZ IZV JRY SDFLILF PLJUDWRU\ ELUGV RI&RQVHUYDWLRQ&R
- 86*6 1DWLRQDO +\GURJUDSKLF 'DWDVHW 1+' $FFHVVHG 'HFHPEHU IURP KWWSV QKG XVJV JRY WRROV KWPO
- 1HZ 0H[LFR 'HSDUWPHQW RI *DPH DQG)LVK 10'*) %LRORJLFDO &RPPLWPHQW 5HSRUW 1HZ 0H[LFR :LOGOLIH RI &RQFHUQ ,QIRUPDWLRQ 6\VWHP 10'*) 6DQWD)H 1HZ 0H[LFR $FFHVVL

KWWS ZZZ ZLOGOLIH VWDWH VSQHPFLQWRFURPDWHLRQDWWLRQHZWHG
DQGHQGDQJHUHG

- 1HZ 0H[LFR 'HSDUWPHQW RI *DPH DQG)LVK 10'*) 7KUH 6SHFLHV RI 1HZ 0H[LFR %LHQQLDO 5HYLHZ 1HZ 0H[LFR &RQVHUYDWLRQ 6HUYLFHV 'LYLVLRQ %LHQQLDO 5HYLHZ $YDLODEOHKWWSSLQZZZ ZLOGOLIH VWDWH QP XV GRZQORDG F HQGDQJVSHFLHVUHFLHV UEHLYHLQHZLVLQ5HLYLHZ ([HFXWLYH6XPPDU\BDQGB)XOOB7H[W SGI
- 86)LVK DQG :LOGOLIH 6HUYLFH 86):6 DQ6HSWHPEHUV E\ &R &RQVHUYDWLRQ 2QOLQH 6HUYLFH (&26 /LQFROQ 1HZ 0H[L KWWSV HFRV IZV JRYEHFFXSUHQQHQWWV\VLHFLHV
- 1HZ 0H[LFR &UXFLDO +DELWDW \$VVHVVPHQW 7RRO 10 &+\$7 0H[LFR +DELWDW ,QIRUPDWLRQ ([WUDFWHG IURP 6SDWLDO 'DWD \$FFHVVHG 'HFHPEHU KWWSZLOGOLIHPHGRZQORDGV
- %LRWD ,QIRUPDWLRQ 6\VWHP RI 1HZ 0H[LFR &RQVHUYDWLRQ 2QOLQH)HDWXUH 6SHFLHV 6WDWXV IRU /LQFROQ WHUUDFH DQG *XDGDOXSH & DQG)LVK 10'*) 6DQ[WHR)H'D1HZ TXHU\ ODVW DFFHVVHG RQO +RPHSDJHWS ZZZ REULQRQW\ VSHFLHV OLVWV DQG VSHFLHV IURPKDWWS ZZZ REULJVRUHSRUWV DVS["UW\SH
- %DW &RQVHUYDWLRQ ,QWHUQDWLRQDO %&, ,QF %DWWV6SHF ,QIRUPDWLRQKDWWS ZZZ EDWFRQ RUJ UHVRXU HGXFDWLRQSURJHFWV\HDU 'HFHPEHU
- H%LUG H%LUG \$Q 2QOLQH 'DWDEDVH RI %LUG 'LVWULEXW 2UQLWKRORJ\ ,WKDFD 1HZ <RUN \$FFHVVHG HEUXDU\ RU\$JYDLODEOH
- :DWHUWKRI8 6 DQG %LRORJLFDO 5HVRXUFHV \$VVHVVPHQW IP /RFDWLRQV DQG \$FFHVV 5RDGV/LQHFRWKH &RQVWUXFWLRQ :LQGZ 3URMHFW %ODQWRQ \$VVRFLDWHV ,QF
- :DWHUV RI WKH 8 6 DQG %LRORJLFDO 3UR5SHRVHGUHQGG\$7XUEXOHQH /RFDWLRQV DQG \$FFHVV 5RDGV DW7RUKHDQEHQ&RRQRVR 1HZ0H 5HSRUW %ODQWRQ \$VVRFLDWHV ,QF
- :DWHUV RI WKH 8 6 DQG %LRORJLFDO 5HVRXUFHV \$VVHVVPH /RFDWLRQ\$FFHVVDQG5RDGV DW WKH 'XU7RQU0HQW:L&RRGX3WR M1HFW0H 5HSRUW %ODQWRQ \$VVRFLDWHV ,QF

- :DWHUV RI WKH 8 6 DQG %LRORJLFDO 5HVRXUFHV $VVHVVPH /RFDWLRQV DQG $FFHVV 5RDGV [illegible] 5HSRUW %ODQWRQ $VVRFLDWHV ,QF
- :DWHUV RI WKH 8 6 DQG %LRORJLFDO 5HVRXUFHV $VVHVVPH /RFDWLRQV DQG $FFHVV 5RDGV [illegible] 5HSRUW [illegible] $VVRFLDWHV ,QF

&XUUHQW &RQGLWLRQV DQG 7UHQGV [illegible] 2YHU 6WXG\ &RUULGRU

7KH &RURQD :LQG [illegible] 0H[LFR 'HSDUWPHQW RI *DPH DQG)LVK [illegible] 3ODLQV 6KRUWJUDVV [illegible] WKH 6RXWKZHVWHUQ 7DEOHODQG [illegible] 4 VSS DQG \XFFD V [illegible] UHSRUWV

$ UHYLHZ RI WKH 1/&' 1/&' [illegible] &RURQD *HQ 6WXG\ &RUULGRU [illegible] (YHUJUHHQ [illegible] 6WXG\ &RUULGRU

7KH &RURQD :LQG [illegible] WKH 3HFRV 5LYHU 8 6 (QYLURQPHQWDO 3URWH :DWHUVKHG +8& 8 6 [illegible] DQG WKH [illegible] +8& DQG WKH $UUR\R GHO 0DFKR ZDWHUVKHG +8& WULEXWDU\ RI WKH 3HFRV 5LYHU 8 6 (QYLURQPHQWDO 3URWHF [illegible] HSKHPHUDO GUDLQDJHV DQG SRQGV DQG HSKHPHUDO [illegible] *HQ7LH 6WXG\ &RUULGRU

7DEOH [illegible] &RURQD *HQ 6WXG\ &RUULGRU

6KDSH	$UHD $FU	3HUFHQW
'HYHORSHG 2SHQ 6SDFH		

6KDSH	$UHD $FU	3HUFHQ
(YHUJUHHQ)RUHVW		
6KUXE 6FUXE		
*UDVVODQG +HUEDFHRXV		
Total	1,537.4	100%

6RXUFH 1DWLRQDO /DQG &RYHU 'DWDEDVH 1/&'

:HWODQGV SOD\D ODNHV IORRGSODLQ&VRUDRQGGLVWULEXWDU\ &ZHUUHQW

7KH 1:, GDWD GRFXPHQWHG D&RUUHVSRQGL*HHQWUXDQG&WKUHU1WKRLQ WKH
LGHQWLILHG ZHWODQGV LQFOXGHG WKUHH ZHWODQG W\SHV IUH
UHYHULQH (\[KLERUWLQJ WR WK&RHDR1*H7QEDWDXWKRUVUKRVPULOGHVURI
PRVWO\ XQDPHG LQWHUPLWWHQW RU HSKHPHUDO VWUHDP IHDW

7KH&RUQQUHLQGUSHUHEDWDRWWKHSXWKH3DVDWHKLVWRU\ SHGXHDOWZQGG
VRXWKHDVWHUQ SRUWLRQ &HQWUDO3DFLILF5RXWH F5RVVHDQG WKH3DFLILF
WK&RUQ WKH3DVDWLQQDWLRQ DVQGKVHQX WKHWRRWZRUGXJK
DOPRVW WLGXHUEQLEHXWHTXHQWWKRXEGHUXVDXVHWKHLQHDLQPRHQWWK V
RYHU PWKWKWDZWWKRSHUFHQWRWKHDUWLFOHVWDXUDHWKHLQWK H
ZDUPVHLVWQWKVKHDLWKURZRWKHVRSWUDFLSLYHDUWLJHQUHQWKH
DQQWRWDO

*HQHUDOROGWHOZERGHVSQHZERHV[LFRHDYXPWKXQGHUDVWURQGHU
LQFRHVWRPDWLRQ KWULP%HFDXWKHRXWKUDQGSQYHJHWLQQRQ
DUHDXQRUVPKWVWRIWHTXHQXWHFDYHRRVPGDUURVYHUIORZ
WKEDQRVHYHURXKVWUQZJKLHZDHWFHURVHKZGPDJELQJFXHVYHUW
DQGRDGZDQLQ QUEDUSRVVFLEXVHLRQJVLGSHURDSEKDHVJQHRZPHXQWLQJ
$SUJXQHVSHFLGRPEVPQDDQKHOUPDDQKHDJHQUHUDSXQJXWW
2FWRPEHUFDVLFRQDZORRSWKHUUJHYHUV

3OD\D ODNHV DUHLQVHGOHSRZHPHOD\ UDLQZDWHU EDVLQV RFFXUL
HFRUHJLRQ 7KHUH DUH HVWLPDWHG WR EH RYHU SOD\D OD
ODNHV RFFX&URZLRQKLQHWWHG\R&RUURQGRULQG 3RJHFW $7KHUHH
DFUHV RI)(0$ PDSSHG IORR&SORQDQ*HQWX&LW&KHQVHH
7DEOH ([KLELW

7DEOH &RURQD 7*HQ 6WXG\ &:RUOGRG 7DEOH %DVHOLQH 8GLH 6HUYLFH 1DWLRQDO :HWODQG ,QYHQWRU\ 'DWD

:HWODQG 7\SH	6XP RI $F	3HUFHQW
)UHVKZDWHU (PHUJHQW :HWODQG		
)UHVKZDWHU 3RQG		
5LYHULQH		
Total	15.0	100%

6RXUFH 86):6 1:, 'DWD 0DSSHU

&XUUHQW &RQGLWLRQV DQG 7UHQGV LQ &RQWURO :DWHU 2YHU 3URMHFW $UHD

7KH &RURQD :LQG 3URMHFW DUHD ZDWHU UHVRXUFH IHDWXUHV VL WK &HRURQD 7*HQ 6WXG\ &RUULGRU :LQG 3URMHFW DUHDV RI 1:, ZHWOD PLOHV RI PRVWO\ XQQDPHG LQWHUPLWWHQW GUDLQDJHV SHUHQQLDO) (VW\

7DEOH &RURQD :LQG 3URMHFW DUHD 7DEOH %DVHOLQH 8GLH 6HUYL 1DWLRQDO :HWODQG ,QYHQWRU\ 'DWD

:HWODQG 7\SH	6XP RI $F	3HUFHQW
)UHVKZDWHU (PHUJHQW :HWODQG		
)UHVKZDWHU)RUHVWHG 6KUXE :HWO		
)UHVKZDWHU 3RQG		
5LYHULQH		
Total	1,524.5	100%

6RXUFH 86)6 1:, 'DWD 0DSSHU

7KH &RURQD :LQG 3URMHFW DUHD PDS RI WKH KDELWDW DQG HFRUHJL GHVFULEHG &RRUYRQD DQG *HQ6WXG\ &RUULGRU

7DEOH 1DWLRQDO /DQG &RYHU DWDEDVH 8GLH 6XPPDU\ 3URMHFW $UHD

/DQG&RYHU	$FUHV	3HUFHQW
%DUUHQ /DQG 5RFN 6DQG &OD\		
'HYHORSHG +LJK ,QWHQVLW\		
'HYHORSHG /RZ ,QWHQVLW\		
'HYHORSHG 0HGLXP ,QWHQVLW\		
'HYHORSHG 2SHQ 6SDFH		
(PHUJHQW +HUEDFHRXV :HWODQGV		
(YHUJUHHQ)RUHVW		

/DQG&RYHU	$FUHV	3HUFHQ\
*UDVVODQG +HUEDFHRXV		
6KUXE 6FUXE		
Total	290,326	100%

6RXUFH1DWLRQDO /DQG &RYHU 'DWDEDVH 1/&'

)ORRGSODLQ

'DWD 6RXUFHV

7KH IROORZLQJ GDWD VRXUFHV EDVHG RQ WKH :(67 UHSRUW ELROORJLFDO UHVRXUFHV RI WKH &RURQD :LQG 3URMHFW \$UHD &RUULGRUV RI WKH :LQG 3URMHFW \$UHD

- 1DWLRQDO /DQG&RYHU'DWDEDVH &"RZQHG UHFRPPHQGV KWWSV ZZZ PUOF JRY QOFG SKS
- &ULWLFDO ,VVXHV \$QDO\VLV IRU WKH3UR3RVHG(6RODU&RQVWUXFWLRQ0DUFK F
- &ULWLFDO ,VVXHV \$QDO\VLV IRU 3UHSDUHG(&RQVWUXFWLRQ0DUFK F
- H%LUG DQ RQOLQH GDWDEDVH RSHUDWHG7KURXJKWKH&RUQHOO/DERUDWRU\ DQG KWWSV HELUG RUJ
- 1HZ H0[LFR &XOWXUDO +DELWDW \$VVHVVPHQW0DS EURXJKW WR \RX E\ 10 &+\$7 KWWS QPFKDW RUJ GDWD KWPO
- 1HZ 0H[LFR 'HSDUWPHQW RI *DPH DQG)LVK 10'*) %LRWD ,Q
- 3OD\D /DNHV -RLQW9HQWXUH E\ 3OD\D/DNHV9HORFLW\ RI%DUEDGRHV UURP KWWSV SODD\DODNHVMY RUJ GRFXPHQWV SODD\DODNHVSURMHFWDUHD SGI
- 5DSWRU 1HVW 6XUYH\ 3DWWHUQV RI(6RQHQF\ 3URJUHVV H
- 6LWH &KDUDFWHUL]DWLRQ 6WXG\ 3RUWV:LQG7XUELQH (\$E\ 3U
- 6RXWKHUQ *UHDW 3ODLQV &UXFLDO +DELWDW\$VVHVVPHQW IURPKWWSV NDUV NX HGX JHRGDWD PDSV VJSFKDW
- 7KH 1DWLRQDO \$XGXERQ 6RFLHW\ \$XGXERQ &RQVHUYDWLRQ%L IURPKWWS ZZZ DXGXERQ RUJDVVHWV PSRUWDQW

- 86):6 (QYLURQPHQWDO &RQVHUYDWLRQ$QF2HQVOLHQG '6\VWHPEHG6SH
  IURKPWWSV ZZZ IZV JRY VRWXWRKEDVHQYHLRQPHQWDOGDWDEDVH
  V\VWHP
- 86):6 ,QIRUP3DDWLQRQQLQJ DQG &RQVXOWDWLRQ 6HVVWHPEHU3D& IU
  KWWSV HFRV IZV JRY LSDF
- 86*6 *DS $QDO\VLV 3URJUDP *$3 3URWHFWHGVHG'DWDHRPEWKH
  IURPWWSV JDSDQDO\VLV XVJV JRY SDGXV
- 86):61:, 'DWD 0DSSHUVHG 'HFHPEHUR P
  KWWSV ZZZ IZV JRY ZHWODQGV GDWD PDSSHU KWPO
- 8QLWHG6WDWHV*HRORJLFDO6XUYH\ 816DWLRQDO +\GURJUDSKLF'DWDVHW 1+'
  'HFHPEHUURKPWWSV QKG XVJV JRY WRROV KWPO
- :DWHUV RI WKH 8 6 DQG %HLVPHQWDU\5HVRXUFHV6HWVVLQG 7X
  /RFDWLRQV DQG $FFHVV 5RDGV/DQWFRWKH &RQWLQHQWDO:LQGZ 3UHFLSLFHF
  %ODQWRQ $VVRFLDWHV ,QF
- :DWHUV RI WKH 8 6 DQG %LRORJLFDO 5HVRXUFHV $VVHVVPH
  /RFDWLRQV DQG $FFHVV 5RDGV DW WKH 7RSHQDQGRF/RR&RXQWG 31HZM0H
  5HSRUW %ODQWRQ $VVRFLDWHV ,QF
- :DWHUV RI WKH 8 6 DQG %LRORJLFDO 5HVRXUFHV $VVHVVPH
  /RFDWLRQV DQG $FFHVV 5RDG3UDWWHWKHDQFUDQ&RXQW\:1HZ 0H
  5HSRUW %ODQWRQ $VVRFLDWHV ,QF
- :DWHUV RI WKH 8 6 DQG %LRORJLFDO 5HVRXUFHV $VVHVVPH
  /RFDWLRQV DQG $FFHVV 5RDGV DWVUWKE7HE&RXQW :1HZG 03HU
  5HSRUW %ODQWRQ $VVRFLDWHV ,QF
- :DWHUV RI WKH 8 6 DQG %LRORJLFDO 5HVRXUFHV $VVHVVPH
  /RFDWLRQV DQG $FFHVV 5RDGV DWWKHQ5HHG&&RXQW :1HZG 03HU
  5HSRUW %ODQWRQ $VVRFLDWHV ,QF

&XUUHQW &RQGLWLRQV DQG 7UHQGV5HJLRQDO 2YHU

6WXG\ &RUULGRU

7KH 10 &+$7 LV D KDELWDW FODVVLILFDWLRQ V\VWHP IRU FUXFL
SULRULWL]DWLRQ VFKHPH ZKHUH UHSUHVHQWV DHUDO LPDJHU\ &+$7 LGHQWLILHG SDWFKHV RI KDELWDW RI FRQVHUYDWLRQ LQWHUHVW WKH
*HQ7LH 6WXG\ &RUULGRU :LQG 3URMHFW $UHD OLH &RUULGRUV IR
3XPD FRQZKRLFKUHILQHGWKDLQNHDVH KDELWDWV IRU VXVWDLQLQ

ODQGVFDSHSV7 107KHVH FUXFLDO KDELWDW DUHDV DUH PRVW SUH
HDVWHUQ &RORUDGR DQG :LQKDH 3UHVZHFWU$UHD FUXFLEOH UFLGXRUDV IZDLOOG ØL
WK&HRURQD7L*HG6WXG\ &RSSUHGLFSUHVHQWK HDHDZDØOHLWKHU 5DN
5DNZKLFK LV GHILQHG DV DUHSDVLWKLDWW ZLOGSOLDHYLHGHUSKULGRULW\ F
ZHWODQG ULSDULGDQY KDEKLDWEDLWDRQIRHUUQSHFLHV RI

)HGHUDOO\ /LVWHG 6SHFLHV

)LYHQLWDQG RQVSHFLHDW WKDW DUH HLWKHU IHGHUDOO\ OLVWHG
HVVHSQPSLDOD WLRQ XQGHU WKH (QGDQJHUHG 6SHFLHV $FW (6$ P
6WXG\ &R8UGL6GRUE 7KHHZ 0H[LFDRGMZ2SLQRJXV=HDSXV KXGVRQLXV OXW
6RXWKZHVWVWHRZEDW(PSHGRQD[WUDLDQGHQ]HKHVULHRNFJWXV
(FKLQRFHUHXV IHQGDUHULOLYDWHDHDXDHMQG HQKHH[LGVRQWRZHG
6WUL[RFFLGHQWDOLVWHG EDVHGOD 7KHUHSRUWSHULGG:6WKH
,QIRUPDWLRQ IRU 3ODQ,QDJHQ&RQVHUYDWLRQIHFWHG E\ DFW
ORFDWLRQRHURQD7L*HG6WXG\ &RRUHUXDWHKWSPX7QNPLDV PLQLPXV
DWULVWLVLVWHDQG GLVGDWH VSHFLHV XQGHUWKHUHYLHZRIDGRRQ
)DFR IHPRVUHSRUWHQW OLRQVHGHLWVQHGDWLRQ[SHUWLRQWKHUSRSXOD
DSORPIDGRRQLFVSRQWRZHGG .XHG]JHRUFJWFRXG SRVVLEO\ EH HQFRX
ZLWKLQ WKH 7UDQV7PLEVVHRQK/LQRWKHUHDOLVWHGYHSUHFXQWRDUHO\FR
EH LPSDFWHG GXH WR WKHLU VSHF7LUDQVKPLEVLWLRQ /LQHWKSEHHXUULG

7DEOH)HGHUDOO\ /LVWHGRUSRQFDL7HQ6WXG\ &RUULGRU

&RPPRQ 1D	6FLHQWLILF	)HGHU6WDW	/LNHOLKRRG RI 2FFX
%LUGV			
0H[LFDQ VS RZO	6WUL[RFFLGH	7	Possible. 3URMHFW LV ORF HOHYDWLRQDO DQG H RZO 'HVLJQDWHG FUL RZO LV DSSUR[LPDWH VRXWKHUQ HQG RI WK IRUHVW ZLWKLQ WKH VXLWDEOH QHVWLQJ
QRUWKSHUQP IDOFRQ	)DOFR IHPRUD VHSWHQWULR	(;31	Possible 6SHFLHV IRUDJH WHUUDLQ ZLWK VFDW OLNHO\ SUHVHQW LQ DUHD

&RPPRQ 1D	6FLHQWLILF	)HGHU 6WDWH	/LNHOLKRRG RI 2FFX
6RXWKZHVV ZLOORZ IO\	(PSLGRQD[WU H[WLPXV	(	Not likely. 3UR MHFW LV QR LQFOXGH GHQVH ULSD ODFXVWULQH RU RWK KRZHYHU WKLV VSHFI WKURXJK WKH UHJLRQ
Mammals			
1HZ 0H[LFR PHDGZRZ SLQ PRXVH	=DSXV KXGVR	(	Not likely. &RUR RQ LH 6WXG &RUULGRUV RW OLNHO\ W ULSDULDQ ULYHULQH RWKHUZLVH VXLWDEO
3HxDVFR O FKLSPXQN	7DPLDV PLQLF DWULVWULDW	&	Not likely. 7KH &RURQD LH*HQW &RUULGRUV RW ORFDWHG NQRZQ UDQJH RI WKH
Plants			
.XHQ]LH 6HGJH FDFWXV	(FKLQRFHUHX YDU NXHQ]OH	(	Possible. &RURQD LH*HQW XG &RUULGRU LV OLNHO\ KDELWDW

6RXUFH 86):6 D

D((QGDQJHUHG &HQWUDO GLDWH (;31 ([SHULPHQWDO 3RSXODWLRQ

6WDWH-Listed Species

6WDWH-listed endangered or threatened species that could occur within the Project area are listed in Table 4.3-2. Species that are unlikely to occur within the Project area due to habitat requirements are not discussed further. Species that could occur within the Project area are discussed below.

*XDGDOXSH L&RQRU ZRRGFK :LQWHU3RRO0HDGZ DV VHOHFWHG 7KHVH VSHFLHV EURZVHU FDQRSLHG OLFDWH\FDQ RFFXUUHQFH ZHDVHO ZLOORZ IO\FDWFK &HGDU &UHHN DQG [HULVW DEXQGDQW LQ SRRUO GUDLQHG IDOOHQ FR SHUHQQLDO VWUHDP EHGV &\QDQWKXV 7KUHH-lined Rush 0RXQWDLQ &7RPRUURZ GR FKLSP TXDGUDQJXODU F\OLQGULFD 7DPPLDV VWULDWXV (XGHUPD PDFXODWXP 3RSXODWLRQ 6WXGLHV QR PRXQWDLQ :KLWH 6DQG &\SUHVV SURQJKRUQ DQG RWKHU OLVWHG

7DEOH 6WDWH /LVWHG 6SHFLHV

&RPPRQ 1DPH	6FLHQWLILF 1DPH	6WDWH 6WDWXV	/LNHOLKRRG RI 2FFXUUH
%LUGV			
EURZQ SHO	3HOHFDQ RFFLGHQ	(	Not Likely 6SHFLHV SULPDULO\ DQG ULYHUH YLVLWRU WR 1HZ FRQWDLQ ODUJH ZDWHUERG DWWUDFW WKH VSHFLHV

&RPPRQ 1D	6FLHQWL 1DPH	6WDV 6WDW	/LNHOLKRRG RI 2FFXUUH
FRPPRQ EO KDZN	%XWHRJD DQWKUDF	7	Not Likely. 3URMHFW LV QRW OLN ULSDULDQ ZRRGODQG KDELW
EDOG HDJO	+DOLDHH OHXFRFH	7	Likely. 6SHFLHV OLNHO\ WR RFF RFFDVLRQDO ZLQWHU YLVLW
SHUHJULQH	)DOFR SHUHJUL	7	Likely. 3HUHJULQH OLNHO\ WR RFFDV\LHDQXQHGVLGHQW DQG
%URE GOOH KXPPLQJEL	&\QDQWK ODWLURV	7	Not Likely. 3URMHFW GRHV QRW D VXLWDEOH ULSDULDQ ZRRGO REVHUYDWLRQ NQRZQ IURP /
JUD\ YLUHR	9LUHR YL	7	Possible. 6SHFLHV PD\ RFFXU LQ VXPPHUVLGHQW RU PLJUDQW
%DLUG V SDU	$PPRGUD EDLUGLL	7	Possible. 6SHFLHV PD\ RFFXU LQ PLJUDWLRQ 3URMHFW HEWHLHGR UDQJH
VRXWKZHVV ZLOORZ IO	(PSLGRQD WUDLOOL	(	Not Likely. 3URMHFW GRHV QRW D VXLWDEOH ULSDULDQ EUHHG VSHFLHV WR PLJUDWH WKUR
0DPPDOV			
2VFXUD 0R &RORUDGR FKLSPXQN	7DPLV TXDGULY RVFXWDH	7	Not Likely. 3URMHFW LV RXWVLGH WKLV VSHFLHV 2VFXUD 0RX
3HDVFR OH FKLSPXQN	7DPLDV PLQLPXV DWULVWU	(	Not Likely. 3URMHFW LV RXWVLGH WKLV VSHFLHV 6DFUDPHQW
VSRWWHG E	(XGHUPD PDFXODW	7	Possible. &OLII KDELWDW JHQHUD EXW VSHFLHV PD\ IRUDJH ZL DUHD
$PSKLELDQV			
6DFUDPHQ PRXQWDLQ VDODPDQG	$QHLGHV	7	Not Likely. 3URMHFW LV RXWVLGH UDQJH RI WKLV VSHFLHV
)LVK			
:KLWH 6DQ SXSILVK	&\SULQRG WXODURV	7	Not Likely. 3URMHFW LV RXWVLGH UDQJH DQG SHEUHGLQHLD SZDPV IURP WKH 3URMHFW

6RXUFH 0%,621
D((QGDQJHUHG7KUHDWHQHG

3ODQWV

1DWLYH EHWDQLFDOUHVRXUFHVLQ&RUHGWXG\LQ&WHQGRESDVOLYHQRIVSHFLHV

ZKLFK LQFOXGH D YDULHW\ RI JUDVV VSHFLHV]ONHU¶V GHGDGHRJ

(FKLQRFHUHXV IHQGOLVUNLQYRDZLQ WRRHRQHRXRQDLWKQGH3DRQGHFRXSDG
SRWLEQWV\ RFFXU&RZLRQKDLQHVWKKG\7&KHUHLGRUDOO\ DQG VWDWH HQ
0DUVK 7KLVWOH :ULJKW V &LUVLX+HZOLDJQWKLX DSQGEBGRXWNQRQZQ
WR RFFXU LQ *XDGDOXEHH X&RQVLQWRHEXUDZRVWKV VLRZQ XLQGH Q$RUWD
IDOO ZLWKLQ WKHLU N+RRGLFJRSORGXEQRUDXQRDQGVWDWLH OLVWHG D
WRRFFX/ULQRQ &RXQW\ $OWKRXJK WKH QRUWKHUQVPRVWLHVWDHGQV
WR WKH 3URMHFW DQG WKHUH LV SRWHQWLDOHIYDUW*RRQGSEQ¶V H
DQG VSLUXFRHUHVW KDELWDWV ZHUH SUHVHQW&RUXFKDK:DEQGW3DUWRGF
$UHD(67 D

%DWV

(LJKWEHDWQ VSHFLHV LQ 1HZ 0H[LFR KDYHRQDDQHHQWRGHDQGSSGRU W
&RURQD :LQ$UHD&MHFW 1RQH RI WKHVH VSHFLHV WKHGDWEQHGDWEQH
HQGDQJHUHG DQG RQO\ WKH V1SRWWHG EDW LV VWDWH OLVWHG

%LUGV

3DVVHULQHV UDSWRUV ZDWHUIRZO D&RRUGRQDWHUEQWXGG\ &RNHUO
*UDVVODQG DSQGRYFLWGRSORYHG KDELWDW GXULQJ PLJUDWLRQ RU GX
PD\ DWWUDFW DLEGRD:DWXHUWRZERQG ZDWHUELUGV LQFOXGLQJ
DWWUDFWHG WR WKH VPDOO HPHUJHQW ZHWODQGV DQG RSHQ Z
WKHVH HUHVRXRSHVLVHKDRQHQW&RHURQD :LQG3URMHFWV
ORFDWHG ZLWKLQ WKH&RRKRYHUWJDDVLRQ3URLGLUHQ %%&&6 ,Q 1HZ 0H
LQFOXGHV %LUGV RI &RQVHUYDWLRQ(67&RQFHDQGG%R&&XU6LQ6WK
&RURQD :LQG3HRMHF%LUGV WKHVH VSHFLHV RQOLVWWKHGHEQDOG H
DUHD ZK&HRUHRQGH 3URMHFW ZLO(67EH GHYHORSHG

%DOG (DJOH

%DOG HDJOHVVDUHG VDWWKHUHDWHQG DQG SURWHFWHG XQGHU W
%(3$ %DOG HDJOHV DUH NQRZQ UWRRXQGFXULWK OHZJHHULGRQVHDW
VSULQJ DQG IDOO PLJUDWLRQ DQG%GXULQJ WKHVH ZLQWHUQFRHP%RUQG
0H[LFR ZLWK QR PRUH WKDQ FXPHQWGYGHXEUHGLHUHVLGQWVRH
FRQILUPHG EDOG HDJOH QHVW ZDV GR'RXFPHQWHGQHVW1D*UH V
DUHDV ZLWK PDMRU ULYHUV VXSSRUWLQJ 1'JK ILVKQSQEXRIDWLR
ZKLFK HWLK&RUQD :LQGQUWKFWQVHDUHVW EDOG HDJOHVRVERXWKD
RI W&RHRQD :LQG3URWRE WV HDJOHV DUH DOVR UHJXO

5LR *UDQGH 5LYHU ZKLFK OLHV DSSUR[LPDWHO\ WZR PLOHV WR WKH HDVW RI WKH 3URMHFW
EH GHYHORSHG :(67 E 3RWHQWLDO EDOG HDJOH QHVWLQJ DQG 5RRVWLQJ +DELWDW
3URMHFW DUHDV &RUULGRUV DQG *HQHUDO 9LFLQLW\ GXH WR WKH SUHVHQFH RI IUHTXHQW GXH WR WKH
SHUFKLQJ IRU QR SODFH IRU DJLQJ KDELWDW +RZHYHU EDOG HDJOHV PD\ XVH RU WUDQVLHQW ZLQWHULQJ
PD\ DWWUDFW IRUDJLQJ EDOG HDJOHV

*ROGHQ (DJOH

*ROGHQ $HDXLOD FKU\VDHWRV SUHVHQW (SHFLHV GXH WR WKH SUHVHQFH RI
0H[LFR UHDXHV 6XLWDEOH EUHHGLQJ KDELWDW DQG WKH SUHVHQFH RI &RURQDGR 1DWLRQDO
&RUULGRUV &RQVHUYDWLRQ DUHDV IRUDJLQJ KDELWDW IRU
IRUDJLQJ LQFOXGLQJ JUDVVODQGV 1R DFWLYH JROGHQ HDJOH
:(67 $SULO

5DSWRUV

%DVHG RQ UDSWRU GLVWULEXWLRQ UHVHDUFK DQG SHFLHV VSHFLILF VXUYH\V
RFFXU ZLWKLQ RU QHDU WKH 3URMHFW DUHD &RURQDGR 1DWLRQDO
:LQG 3URMHFW &RURQDGR 1DWLRQDO F&RQVWUXFWLRQ KDELWDW IRU
ZHWODQGV &RQVHUYDWLRQ DUHDV &RURQDGR 1DWLRQDO F&RQVWUXFWLRQ D VPDOO SHUF
KDELWDW FRXOG VXSSRUW VPDOO QXPEHUV RI QHVWLQJ SDLUV RU LQGLYLGXDOV
VKDUSVKLQ&RRSHU¶V >DZNV DQG RWKHU UDSWRUV RU RZOV
RQ EDUHG VRLO RU RSHQ @>WJUDVVODQGV KRUQHG RZO)HZ WRSRJUDSKLF IHDWXU
ERGLHV RI ZDWHU RU RWKHU &RURQDGR 1DWLRQDO &RUULGRUV UHJXODU\ DWWUDFW
FRQFHQWUDWLRQV RI PLJUDWLQJ UDSWRUV

&XUUHQW &RQGLWLRQV 5HQHZDEOH &RPELQHG &\FOH &RPELQHG
3URMHFW $UHD

)HGHUDOO\ /LVWHG 6SHFLHV

7KH ODUJHU JHRJUDSKLF DUHD RI WKH &RURQDGR 1DWLRQDO &RUULGRU
VSHFLHV WZR ELUGV DQG WZR SODQWV &RQVHUYDWLRQ &RQVLGHUDWLRQV LQ
&RUULGRU 7KH &RURQDG \HQGDQJHUHG &RQVHUYDWLRQ DUHDV SURWHFW
SOD\&HUD UDGULX3HFFRVR SXS]]OHV QSDUDGR[DQWKXV SDQGU:DGLRXV¶V
PDUWKLVWLHV XPEHUHG LQ WKH ,3D& UHSRUW 1RQH RI WKHVH I
WR EH HQFRXQWHUHG LQ WKH &RURQDG :LQG 3URMHFW $UHD 7DE

7DEOH)HGHUDOO\ /LVWHG 6SHFLHV LQ &RURQD :LQG 3URMHF

&RPPRQ 1DPH	6FLHQW 1DPH	)HGH 6WDW	/LNHOLKRRG RI 2FFXUUHQ
%LUGV			
\HOORZ ERLO FXFNRR ZHVWH SRSXOD	&RFF\]XV DPHULFD	7	Not likely. 3URMHFW LV QRW OLNHO\ ZHWODQGV ULYHULQH ODFXVW 7KHUH LV DW OHDVW VRPH SRW WKURXJK WKH DUHD
0H[LFDQ VSRWWH	6WUL[RFFLGHQ OXFLGD	7	Possible. 3URMHFW LV ORFDWHG ZLW HFRORJLFDO UDQJH IRU WKH RZ WKH RZO LV DSSUR[LPDWHO\ P WKH 3URMHFW (YHUJUHHQ IRUH SURYLGH VXLWDEOH KDELWDW QHVWLQJ R
VRXWKZH ZLOORZ IO\FDWF	(PSLGRQ WUDLOO	(	Not likely. 3URMHFW LV QRW OLNHO\ ULYHULQH ODFXVWULQH RU RW WKLV VSHFLHV PD\ PLJUDWH WK
QRUWKH DSORPDO IDOFRQ	)DOFR IHPRUDO VHSWHQ	(;31	Possible. 7KLV VSHFLHV IRUDJHV LQ VFDWWHUHG VKUXEV ZKLFK LV 3URMHFW DUHD
3LSLQR SQRY	&KDUDGU PHORGXV	7	Not Likely. 1R VXLWDEOH VKRUHOLQ SURMHFW
6SUDJXH SLSLW	$QWKXV VSUDJXH	&	Possible. 7KLV VSHFLHV QHVWV LQ * 3UDLULH RI JUDPD DQG EXIIDOR LQ SRUWLRQV RI WKH 3URMHFW
Mammals			
1HZ 0H[PHDGRZ MXPSLQ PRXVH	=DSXV KXGVRQI OXWHXV	(	Not likely. 3URMHFW LV QRW OLNHO\ ULYHULQH ODFXVWULQH RU RW
3HxDVFF FKLSPXO	7DPLDV PLQLPXV DWULVW	&	Not likely. 7KH 3URMHFW LV QRW OLNHO\ ZLWKL UDQJH RI WKH VXEVSHFLHV
Plants			
3HFRV SX]]OH SDUDGI 6XQIORZ	+HOLDQV SDUDGR[	7	Not likely. &RURQD 7L*HQ 6WXG\ &RUULG ZLWKLQ WKH NQRZQ H[WDQW UD
:ULJKW 0DUVK 7KLVWO	&LUVLXP ZULJKWL	&	Not likely. &RURQD 7L*HQ 6WXG\ &RUULG ZLWKLQ WKH NQRZQ H[WDQW UD
.XHQ]OH KHGJHKF FDFWXV	(FKLQRF IHQGOHU NXHQ]OH	(	Possible. &RURQD 7L*HQ 6WXG\ &RUULGR LQFOXGH VXLWDEOH KDELWDW

6RXUFH 86):6 D
D((QGDQJHUHG 7KUHDW &HQDQG LGDWH

6WDOWLHVWHG 6SHFLHV

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%DWV

(LJKWEDWVSHFLHV LQ 1HZ 0H[LFR &RORUDGR DQG7H[DV &RQVWUXFWLRQ&RQWUDFWRU6WXG\&RUULGRU
DO %DW &RQVHUYDWLRQ ,QWHUQDWLRQDO >%&,@ WHG D1RQ
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LQFUHDVHG DEXQGDQFHRIORFXVWHDRXW&RQVWUXFWLRQ DQG WUHHV
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%LUGV

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LQ &RQVWUXFWLRQ D3URMHFW&RQVWUXFWLRQ DUHV EDOG HDJOHV ZHUH VRHXVWKYHGWRE
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RFFDVLRQDOO\ DV PLJUDQWV RU WUDQVLHQW&RQVWUXFWLRQ&RQWUDFWRU EUHHGL
3URMHFW&RQVWUXFWLRQ&RQWUDFWRU &RQVWUXFWLRQ EDOG HDJOHV

*ROGHQ (DJOH

*ROGHQ HDJOHV DOVR DUH SURWHFWHG XQGHU&RQVWUXFWLRQ&RQWUDFWRU DUH N
H%LUG 7&RURQD :LQG 3URMHFWLQ&RQVWUXFWLRQ HYHUDO VXLWDEOH EUHHGL
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UDSWRU VSHFLHV SRWHQWLDOO\ RFFXUULQJ LQ WKH SURMHFW DUHD LQFOXGH WKH
IDOFRQ 10'*)$OO UDSWRU VSHFLHV 0LJUDWRU\ %LUGV RI 7UHDW\ $FW
DQG EDOG DQG JROGHQ HDJOH %*(3$ SURWHFWHG :LQGHU WK
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VWULEXWLRQ WR VWDWH DJHQFLHV RU RWKHU JRYHUQPHQWDO RUJDQL]DWLRQV
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'DWD 6RXUFHV

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'DWD 6RXUFHV

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- 1DWLRQDO /DQG &RYHU 'DWDEDVH 1/&'
- 7KH 1DWLRQDO 0DS 86*6
- /LQFROQ &RXQW\ &RPSUHKHQVLYH 3ODQ $XJXVW
- /LQFROQ&RXQW\GRLDWHU &RQVHUYDWLRQ 'LVWULFW /DQG 8VH 3ODQ
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- 7RUUDQFH &RXQW\ =RQLQJ 2UGLQDQFH UHYLVHG
- -RKQ & 7\3VV'7KHQJFRQRPLF DQG)LVFDO ,PSDFW RI WKH &RU
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IURP VSUDZOLQJ UDQFK ODQGV WRO PRHDWXUHQVLHQWVLQFRO Q,P&RRU
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)LUHV ODYD ILHOGV 7KH/LEQFRPPD&RQJUHVVLRQDOZDVV VDHQGY H 5RXWH
EL VHRWXQWKHUXQWRLZ[HWDEOLVWHY HUDO VPDOOKUHXSRRXWV WKH
&RXQW\ LQFOXGL9JOWKN &DQEK]R*]DU) 5DQFKG 6XHGEDR%OXDQLF
5HJLRQDO7&LU/RQF6WDWH 6WDWHURZGHGSEL\VP3DWR 1DWXUDO *DV
OFDWHG DERXW &RPPLQLW/HQWXG\ (QYLRQPHQWDO DVSHFWV DUH
OFDWHGUHDG WKH

7KH FRPPXQLWLGRV FRQWDLQV WKH ODUJHVW SRSXODWLRQ ZLW
DSSURPLPDWHOHV &HQVXVQD*HRJUDSKLF\&KDUDFWHULVWLFV RI WKH
FOVHVW SRSXODWHGHDVWRUURXQGLQJ\&RPPXQLWLHV DUH
WRZQV DUH VFDWWHUHG\WKURXJKRXW WKH &RXQW\
/LQFROQ 1DWLRQDO)RUHVW 6PRNH\%HDU:LOGHUQHVV

%XUHDX RI /DQG 0DQDJHPHQW SURSRVHV WR UHGXFH WKH 8 6 &HQVXV
$JULFXOWXUH WKHUH ZHUH WRWDO DFUHV RI IDUP DQG
&RXQW\ OHDVLQJ DSSUR[LPDWHO\ DFUHV RI WKH LQHGKDVH EHPHQW
SHUFHQW GHFUHDVH LQ IDUPV DQG D SHUFHQW GHFUHDVH LQ
ODQG XVH LV VKLIWLQJ IURP IDUPLQJ DQG UDQFKLQJ WR GHYHO

7KH LQFRQ &RXQW\ &RPSUHKHQVLYH 3ODQ SURYLGHV JXLGDQFH IRU VSHFLILF ODQG XVH UHJXO
SURYLVLRQV DQG JXLGDQFH DQG IRU SHUPLWWLQJ DQG GHYHORSPHQW -XULVGLFWLRQDO DXWKRULW\ LV
WKDW DUH VWULFWHU WKDQ VWDWH RU IHGHUDO &RQGLWLRQDO XVHV DUH
UDQW &'% IXQGV IRU WKH /LFHQVHG &RQWUDFWRU &RPSUHKHQVLYH 3O
JRYHUQPHQWDO DSSURDFK DQG SDUWLFXODU SROLFLHV WR EH
ERDUGV DQG GHPRQVWUDWLRQ /LQFROQ &RXQW\ SDUWLFXODU\ LQWHQ
WKDW ZLOO FXOWLYDWH FRQVWUXFWLRQ DQG SDUWLFLSDWLRQ LQ WKHLU ZLWKL

/LQFROQ &RXQW\ KDV DQ DSSURYHG VXEGLYLVLRQ R7KHU 6WDQGDUGV
1HZ 0H[LFR LVVXHV EXLOGLQJ SHUPLWV IRU WKH XQLQFRUSRUDW
5XLGRVR LVVXHV EXLOGLQJ SHUPLWV ZLWKLQ LWV ERXQGDULHV
ZLWKLQ RQH PLOH RI WKH 5 R L G R V 7 K H L U LV QR]RQLQJ LQ WKH X
H[FHSW IRU D 6SHFLDO =RQLQJ 'LVWULFW LQ $OWR DQG VHYHUD
([WUDWHUULWRULDO =RQH DQG WKH 5XLGRVR DRZHVF(QWUDWDHUUH
VXEGLYLVLRQ 7KHUH DUH DOVR KLVWRULFDO SUHVHUYDWLRQ U
UHJXODWLRQV 7KH ([WUDWHUULWRULDO =RQLQJ $XWKRULW\ (7
H[WUDWHUULWRULDO]RQH DQG WKH UHVXOWLQJ]RQLQJ &RPPLVVLRQ
FRPPLVVLRQ RU WKH H[WUDWHUULWRULDO]RQH

7KH LQFRQ DQG :DWHU &RQVHUYDWLRQ 'LVWULFW RFFXSLHG DQG
UDQJH SULRULW\ FRQFHUQV &RQVHUYDWLRQ:DWHUVKHG PHQW 3O
ZDV DGRSWHG DV WKH &RPSUHKHQVLYH 3ODQ RI WKH /LQFROQ 6
7KH PLVVLRQ RI WKH /LQFROQ 6:&' LV WR SURWHFW DQG LPSURY
UHVRXUFHV E\ SURYLGLQJ SURJUDPV DQG GHYHORSPHQW &RXQW
LPSOHPHQW FRQVHUYDWLRQ SUDFWLFHV

7KH &RURQD (OHPHQWDU\ +LJK 6FKRRO [illegible] ERXQGD [illegible] VWXG [illegible] VWDII PH [illegible]

/LQF [illegible] DQG [illegible] :LOGHU [illegible] VSD [illegible]

7RUUDQFH &RXQW\

7RUUDQFH &RXQW\ [illegible] LQ FHQWUDO 1H RI WKH [illegible] 2YHU SHUFHQW RI WKH SRSXODWLRQ UH)D [illegible] DQG UDQFKLQJ KDYH EHHQ WKH WUDGLWLRQDO HFRQRPL WKH SRSXODWLRQ JURZV LQ WKH (VWDQFLD [illegible] FRPPHUFH [illegible] :LQG 3U [illegible] GHYHORSHG FRPH IURP 7RUUDQFH [illegible] EXW FRXQWLHV DJULFXOWXU [illegible] ZLWK [illegible] $OEXTXHUTXH PHWURSROLWDQ UHJLRQ D UHVLGHQWLDO VXEGLYLVLRQV DQG KRXVLQJ GHYHORSPHQWV

9DULRXV MXULVGLFWLRQV DQG VSHFLDO WHUULW [illegible] ZLWKLQ PXQLFLSDOLWLHV [illegible] ,QGLDQ 5HVHUYDWLRQ $OVR WKHUH DUH DO [illegible] RI SULQ [illegible] LW [illegible] QHW [illegible] WKH [illegible]

7KH FRPPX [illegible] WDLQV WKH ODU [illegible] DSSUR[LP [illegible] FORVHVW SRSX [illegible] WKH &RU [illegible] VFDWWHUHG [illegible] 0RXQWDLQV 6WDWH 3DUN [illegible] 8 6 %X /DQG 0DQD [illegible] ([K [illegible] LOLWDU\ EDVHV DUH ORFDWHG

/DUJH FDOH LUULJDWHG DJULFXOWXUH KDV EHFRPH D PDMRU IHDW
$OWKRXJK WKHVH DJULFXOWXUDO FURSODQGV UHO\ VROHO\ RQ
HOLPLQDWH V/DFKWOOD QG KXEHVWSDHRG YHDQJHODQGRXQWRJKHRXW
DWWUDFWHG D UDQFKLQJ OLYHOLKRRG IRU D VPDOO EXW GLVSH

7KH RUURQRXHRXFHWRS&UHKHQVLYH 3ODQHUXQQ\ODQG XVH SODQQLQ
SURYLGHVDWKHDQGWXRC DQFH IRU VSHFLILF CHDQRGSHGHWUWJKHDWH
JRYHUQPHQW ,W HVWDEOLVKHV D EDVLV IRU UHJXODWLRQV DQG
ODQG GHYHORSPHQW ZLWKLQ WKH [RXPSLVHGLBQQDQRSHURPRRUHVDQFH
FRQVLVWHQF\ DQG FRQWLQXLW\ LQ PDNLQJ GHFLVLRQV WR FDUU
7RUUDQFH7KHRX&QRXQW\ SUHVHQWO\ DGPLQLVWHUV WKH FRPSUHKH
VXSSRUWHG E\ UHFJXODWRU\ DQG RUGLQDQW SROLFLHV $FWXDO LPSOH
&RPSUHKHQVLYH 3ODQ LV VXEMHFW WR WKH SROLF\ GLUHFWLYH
DV GHHPHG DSSURSULDWH

,Q DFFRUGDQFH ZLWK WKH 7RUUDKQHH7RURXQW\&RQWU\ &RPSUHKHQVLYH
UHYLVHG SWDEOLVKHV FRPSUHKHQVLYH]RQLQJ UHJXODWLRQV I
&RXQW\ ,W LV GHVLJQHG WR SURPRWHRXOHVWKHDOWKHDQG WKHHJHQ\QIHUU
IORRG DQG RWSKURWKHGDQJHURXV ZDWHU UHVRXUFHV IDFLOLWDWH
VROLG ZDVWH PDQDJHPHQW ZDWHU DQG GZDWWKHZDVHPXQLWLHV
UHTXLUHPHQWV FRQVHUYH WKH YDOXH RI SRUSRPSHQWVRIDQGQSUDQ
RWKHU UQHDWRXUQDFWRXHQW\

7KHDVW 7RSURRDQDEHG :DWHU &RQVHUYDQWLERQG'DVWULFW
SURPRWHV VWHZDUGVKLS RI QDWXUDO UHVRXUFHV EDSURYLGLQ
DVVLVWDQFHVLWWRWKH'LVWULFW

7KHVWDQFLD (OHPHQWDU\ 0LGSSUHR[LPDWHOWHKDQG WRXXVHDQG
NLQGHUJDUWHQ WKURXJKRXW WKH SRUWLRQ RI WKH SPLQHRUDWH
7LWXG\ &RXQW\ KDV QDWX³UDOXQQGÁF3HQULFRU
DQG VXUURXQGLQJ VDOW ODNHV DUH KLVWRULFDOO\ DQG FXOWX

*XDGDOXSH &RXQW\

*XDGDOXSHVW&KRXQWBXORXVQ1HXZ[LFRDWRGRDOVDUHVTXDUH
PLO,HW LV ORFDWHGWKHDVWHUQ TXDGUDQW RI 1HZ0H[LFR\DQGXQW
ZLWK D SRSXODWLRQ RI $JULFXOWXUH LV RI JUHDW HFRQR

ORFDWLRQ DQG QDWXUDO UHVRXUFHV KDYH KLVWRULFDOO\ DO
VPDOO FDWWOH DQG RUVHHQFH R&SRHXQDWWZLHRVQWDEDQGW/HQFWRRQW&RXQW\
VRXWKZHVWHUQ VWDWH DQG IHQGHUHRVDD/QGNH L6QFDWXHG3DSDN 6XPQHU
DQG VFDWWHUHG 8 6 %XUHDXF(RRKVIDLQG 0DQDJHPHQW

7KH FRXQW\ JRYHUQPHQW RI *XDGDOXSH LV IRXQG LQ WKH FRXQ
ZLWKLQ *XDGDOXSH &R1XHQZV0HD[LFRJRWHDWHG3XEOLHVODQG3HUVHWXWORZQL
SUR[LPLW\ WR WKH6FUHDQ WKHV WLRZQ RI 9DXJKQ ORFDWHG DSSUR
1R PLOLWDU\ EDVHV DU7KHER9FDXWKRG (QHWKEWFDX\QWL\JRVWHRO VH
VWXGHQWV DQG NFLRQYGHUVJDUDGHQVSKUHRXRO LWKORVEDWG7DSHSVIR
PLOHV QR&RVUKRQDW*HKRWXG\E&RXQG&LW\ RI 6DQWHSDRVDWKHDV
ODNHV DQG VFWLWHSPDUDQGVXEHUJRRSSRUWXQLWLHV DUH DYDLODE
SDUNV DQG DORQJ WKH 3HFRV 5LYHU

&XUUHQW &RQGLWLRQV DQG 7UH±Q&GVURQHJL:RQG2YHU
3URMHFW $UHD

7KH H[LVWLQJ FRQGLWLRQV &SRUHYQLDXHWQWXGHQWRUOLQGRUVH WKRV
DSSO\ I&RUUWKEH :LQG 3+RRZHHYHWU &WHRQD (OHPHQWDU\ +LJK 6FKRR
PLGHVWHVWKRURQD :LQG 3EURXQGHGWU\DXHJKQ (OHPHQWLDUQR+LJK6G
DSSUR[LPDWHO\ R&RQEDQ QLQUGW3URMHFWKWWSWDHQFLD
(OHPHQWDU\ 0LGGOH +DJSS6RK[RRPLQHWRQRVWKWKRQD :LQG 3URMHFV
$UHDRXQGDU\

6RFLRHFRQRPLFV

'DWD 6RXUFHV

7KH IROORZLQJ GDWD ZHUH UHYLHZHG WR DVVHVV WKH RQHGLWLRQV
7RUUDQFH DQ&RXQWKHRUXPQHL*HQWXG\ D&RG&WKRQD :LQG 3URMH
$UHD

x -RKQ & 7\3VV'7KHLQFRQRPLF DQG)LVFDO ,PSDFW RI WKH &RUF
0H[LFR

&XUUHQW &RQGLWLRQVHJDUGLQJ7UDIILF&LUFXODWLRQDQG7UDQVSRUWDWLRQ

6WXG\ &RUULGRU

7KHUHD ZKHUHRQVKHLQG3DFRHFWVWYDLODEOHGDWD UXUDO UHJLRQ
0H[LFR GRPLQDWHGEHUW KJKJH ODQGV DQG IRUHVWHG PRXQWDLQ
RIWKH DUHD 7KH ODUJHO\ UXUDO DUHD KDV VLJQLILFDQW DFFHV
ZLWK UHODWLYHO\ FORVH DFFHVV WR UHFUHDWLRQ DQG UHVRUV
FRPPXQLWLHV WR WKH VRXWKWEHQG LZHVWRVZHOOORQG $OODPRHJFHG
WKH ¶V WODWHVW PHWURSROLWDQ DUHD FRPSULVLQJ WKH $OEXTX
FRPPXQLWLHV KORHXVVWKLDQRDUHQDWHKHQWXG\ &RHUVHGRDUJHU SRSXO
FHQWHRIEZLQHG ZLWK WKH WUDGLWLRQDO DUDHQDFKLKHRUHRQWKQLWH
:LQG 3URMHFWEH GHSYHRYRSHGZLGH UDQJLQJ HFRZKRLPFLKF ZDLQGO FXOW
VXSS3HEWHFW DFWLYLWLHV

*XDGDOXSH\&RXWKH VPDOOHUXHQEWLJHRWKHSWKLEHDUHD DQG DOVR KD
RI WKH SRSXODWLRQ RI WK&RXQWHUKWZRE RWKQWKLHVODULQHFRQQS R
JHRJUDSKLF DUHD 7RUUDQFH&RXQWS\RSXODWHQKDVQWKHVODUJHVW JRUHWD
RYHUYLHZ ¶V SWRSHXODWLRQ GHPR7DEOSKLFV LV VKRZQ LQ

7DEOH 6WXG\ $UHD &RXQWLHV

&RXQW\	3RSXODWL	*HRJUDSKLF $ 6TXDUH 0LO	3RSXODWLRQ ' SHRSOH VTXDU
*XDGDOXS			
/LQFROQ			
7RUUDQFH			
Study Area Total	36,300	11,209	3.2

6RXUFH(FRQRPLF DQG)LVFDO ,PSDFW RI WKH &RURQD :LQG 3URMHFW LQ

6DQWD 5RVD ZLWK D HVWLPDWHG SRSXODWLRQ RI LV W
DOVR WKH RQO\ FRPPXQLW\ OLQWWLRKH HFRQRPLF VHYHU
ODUJH FRPPXQLWLHV&ŠHUDWHG SRSXODWLRQ &RXQW\ KDV LWV SULPD
FHQWHUV DORQJ WKH RQKWHEWKQWW\HVHDFWLQ (VWDQFLDRSXODWL
SRSXODWLRQWDO\ WKHVH SRSXODWLRQ DUHDV D
LQ WKH ZKHRRQWKHG UMZHFWVRFQXHUSHQWQXP VLQFH 7KH
DUHD ZKHRRQWKHLQG3XEHGHWHVRSHZKRSHULVHQWZ
0H[L¶VRSRSXODWLRQ

7KHUHD ZKHUHRQVKHLQGLYLGXDOHFKDVWHDRVHEWDPOOQHU IRUFH UHSR
RI DQG HPSOR\PHQW RI SHDNHQWDWLRQDOHVWLGH HPSOR\PH
XQHPSOR\PHQW WKUHDWHQHG ZKHUH WKH &RURQD :LQGHUZLWKFWV ZL
VRPHZKDW KLJKHU WKDQ WKWDXQBHPSOHQW UDWH LQ WKH

WRWDO ZDJHV DQG VDODULHVDUROLQWKHKHUHFQRHPLQG Q
3URMHFWHFRQRPLFV GHYHORSHGDVWLPDWHG DYHUDJH DQQXDO FRPSHQVDW
7KH 1HZ 0H[LFR VWDWHZLGHQDYLVUDJH FRPSHQVDWLRQ UHYHQXHV
VDODULHVZKHUHRQWKHLQGLUHFWEHQHILWVRSHQGLQJ
WKH VWDWHGLVWULEXWHGDFURVV WKH HVWLPDWHG DSUHDFKWKRXQQFRPH
:LQG 3URMHFWV IRU WKH LVFWKHLJK1HZ 0H[
SURSRUWLRQDOLW\ZKHUHRQWKHLQGLUHFWEHQHILWVSHQGLWD LQFRPH LQ
UHODWLRQVKLS WR 1HZ 0H[LFR VWDWH DQG ZKHUHSHQGLWD S
LV OLNHO\ UHIOHFWLQJ WKH UROH RI LQYHVWPHQW DQG UHWLUH
SRSXODWLRQHDUQHUVZKRPLJUDWHWRQQHZ MREVFUHDWHG

7KH ODUJHO\ UXUDODUHSDUWLFLSDWLQJVRGRXUQDOLVWG VRFLRHFRQ ODQG
XVH LV IRFXVHG RQ DJULFXOWXUDO EXVLQHVV HQWHUSULVHV S
DFWLYLWLHV PHDVXUHG E\ UHSRUWHG HPSORSPHQWODVWLDQGRQGWKH
FDUH

3ULYDWH ILUPV FRPPHUFLDOHQWWKDEERXWLQHVUHQWKH
3URMHFWHFRQRPLFV GHYHORSHUV WKLV GDWD H[FOXGHV DJULFXOWXUDO
WR EH D VLJQLILFDQW WF DQ WKFRPSXQDDUHEHQWKHLQG R3XEOHM HFWV
GHYHORSHUV WR WKH SRSXODWLRQ DQG SUHGRPDQDQWO\ UXUDO
HVWDEOLVKPHQWV WKDW KDYH EHHQ LQ EXVLQHVV 3URMHFWV
OLPLWHG QXPEHU RI HPSOR\HHV

([FOXGLQJ WKH DJULFXOWXUDO VHFWRUHFRQRP&RQWUDFWLF VX
3URMHFWHFRQRPLFV GUDIWFRQ PER\GUHWLRQV DQG IRRGVHLDYLFHV
DVVLVWDQFH DQG SXEOLFXGHFQVUWUDQVWRQHWKHVWLPDWRXQG
HPSOR\PHQW IER\ULQG KVDWUHD ZKHUH WKH &RURQD :LQG 3URMHFWV

7DEOHSUHVHQWV DQ DJULFXOWXUDOHUHOSKUHR&RQHR QRU:LQGH 3URMHFW
GHYHORSVSHHGWDEOH GRHV QRW LQFOXGH IRUHVWU\ GDWD DV WKL
FHQVXVHV

7DEOH DQG 1HZ 0H[LFR 3URMHFW $UHD)DUP 'HPRJUDSK

DQG)DUP 'HPRJUDSKLFV					
1XPEH RI)DUP			$YHUDJH) 6L]H DFU		
0DUNHW 9DOXH RI 3URGXFWLRQ DQG PLOOLRQ					
&URSV		/LYHVWRFN DQG		7RWDO	
9DOXHV RI 6DOHV E\ &RPPRGLW\ *URXS PL					
*UDLQ 'U\ %HDQ DQG 3HDV	&RUQ	2WKHU &URSV	&DWWOH &DOYHV	2WKHU /LYHVW 3RXOWU\	

6RXUFH 7KH (FRQRPLF DQG)LVFDO ,PSDFW RI WKH &RURQD :LQG 3URM

7KH UROH RI DJULFXOWXUH LQ WKH &RURQD :LQG 3URMHFW UHJLRQ LV ZHOO UHIOHFWHG LQ FRPSDULQJ WKH UHSRUWHG PLOOLRQ DJULFX 7D[DEOH *URVV 5HFHLSWV DQG 3URSHUW\ 7D[HV LQ WKH &RURQD :LQG 3URMHFW UHJLRQ E\ GHWDLOHG FDWHJRULHV RI SURGXFWLRQ GRPLQDQW HPSOR\PHQW DQG LQFRPH LQ WKH UHJLRQDO HFRQRP

7KH UHVXOWV RI WKH &RURQD :LQG 3URMHFW DUH SUHVHQWHG IRU WZR 7D[*57 FROOHFWLRQV LQ WKH &RURQD :LQG 3URMHFW UHJLRQ DQG LQFOXGH WKH 7KH HFRQRPLF VHFWRU UHSRUWLQJ DUHDV DQG &RURQD :LQG 3URMHFW UHJLRQ DUH GHYHORSHG 5HWDLO 7UDGH VHFWRU RI WKH *57 FROOHFWLRQV 7KLV LV ZKROO\ UHVSRQVLEOH IRU WKH *57 &RQVWUXFWLRQ DQG 7UDQVSRUWDWLRQ VHFWRUV DUH GHYHORSHG IURP WKH ODUJHU SRSXODWLRQ ZRUNHUV IURP WKH ODUJHU SRSXODWLRQ 3URMHFW $UHD

&XUUHQW &RQGLWLRQV DQG 7UHQGV LQ 5HJLRQDO 2YHU 3URMHFW $UHD

7KH[LVWLQJ VRFLRHFRQRPLF DQG HFRORJLFDO FRQGLWLRQV LQ WKH &RURQD :LQG 3URMHFW DUH VLPLODU WR RWKHU UXUDO &RORUDGR FRXQWLHV

&RPPXQLFDWLRQ 6LJQDOV

'DWD 6RXUFHV

7KH IROORZLQJ GDWD VRXUFHV ZHUH XVHG WR GHYHORS WKH GHVFULSWLRQV RI WKH 7RUUDQFH DQG&RXQW\ &RPPXQLFDWLRQV 7RZHU &RPPXQLFDWLRQV LQ WKH :LQG 3URMHFW $UHD

x)&&LQIR EDVHG RQ SXEOLFO\ DYDLODEOH&RPPXQLFDWLRQV7RZHU&RQGLWLRQDO 8VH $SSOLFDWLRQ 'HFHPEHU ZZZ)&&LQIR FRP GLVFODLPHUSKS

&XUUHQW &RQGLWLRQV DQG 7UHQGV RI5HDO:RUOG 2YHU6WXG\ &RUULGRU

/LQFROQ 7RUUDQFH&RXQW\ &RPPXQLFDWLRQV &RPSUHKHQVLYH&RPPXQLW\ 3ODQ [LFR ZLWK SRSXODWLRQ GHQVLWLHV ZKHUH SRSXODWLRQ &RUULGRU &RPPXQLW\ &RPPXQLFDWLRQV 7RZHU &RQGLWLRQDO 8VH $SSOLFDWLRQ &RUURQD:LQG3URMHFW &RUULGRU &RPPXQLW\ &RPPXQLFDWLRQV 7RZHU &RQGLWLRQDO 8VH $SSOLFDWLRQ &RUURQD:LQG3URMHFW &RUULGRU &RPPXQLW\ &RPPXQLFDWLRQV 7RZHU &RQGLWLRQDO 8VH $SSOLFDWLRQ VWUXFWXUHV DQG ZLOO EH DVVHVVHG DW WKH SURMHFW OHYHO

&XUUHQW &RQGLWLRQV DQG 7UHQGV RI:LQG2YHU 3URMHFW $UHD

&RPPXQLFDWLRQV &RQGLWLRQDO 8VH $SSOLFDWLRQ :LQG 3DUN3HWLWLRQHU &RPPXQLFDWLRQV &RPSUHKHQVLYH &RPPXQLW\ 3ODQ GHVFULEHV WKH HQYLURQPHQWDO DQG VRFLRHFRQRPLF &RQGLWLRQV

5DGLRDFWLYH :DVWH DQG 5DGLDWLRQ +D]DUGV

(OHFWULF WUDQVPLVVLRQ OLQH DQG &RPPXQLFDWLRQ7RZHU&RQGLWLRQDO8VH $SSOLFDWLRQ UDGLDWLRQ KD]DUGV 7KHZRXOG&RQWDLQ&RPPXQLFDWLRQ7RZHU&RQGLWLRQDO8VH $SSOLFDWLRQ KD]DUGV &RQWKHUHVRXUFHV&RQVHUYDWLRQ&RPPLVVLRQ(6 IXUWKHU LQ WKLV

+D]DUGRXV 0DWHULDOV

3ULRU WR FRQVWUXFWLRQ&RPPXQLW\ &RPSUHKHQVLYH3KDVH3ODQ&RPPXQLW\ &RPPXQLFDWLRQ7RZHU&RQGLWLRQDO8VH $SSOLFDWLRQ KD]DUGRXV PDWHULDOV VXEVWDQFHV&RPPXQLW\ &RPPXQLFDWLRQ7RZHU&RQGLWLRQDO8VH $SSOLFDWLRQ &RUURQD:LQG3URMHFW &RUULGRU &RPPXQLW\ &RPPXQLFDWLRQ7RZHU&RQGLWLRQDO8VH $SSOLFDWLRQ &RUURQD:LQG3URMHFW &RUULGRU GHVFULEHV SRWHQWLDO LPSDFWV DVVRFLDWHG ZLWK FRQVWUX D WUDQVPLVVLRQ OLQH VXEVWDWLRQ DQG SURMHFW &RPPXQLW\ &RPPXQLFDWLRQ7RZHU&RQGLWLRQDO8VH $SSOLFDWLRQ &RUURQD:LQG3URMHFW &RUULGRU KD]DUGRXV PDWHULDOV

6DIHW\

7KH&RURQD7L*HQWXG\&RRUGLQDWRUFRQWDLQ DQ\ NQRZQHVFDWLRQ FRQF
GHVFULEHV SRWHQWLDOFRQVWUDLQWVDVVRFLDWHG\ZLWKFRQVWUXFWLRQ RSHUDW
OLQH VXEVWDWLRQ DQG VZLWFK\DUG DV ZHOO DV SURWHFWLR

*HRJUDSKLF 5HVRXUFHV

'DWD 6RXUFHV

7KH IROORZLQJ GDWDVHWV ZHUH XVHG WR GHVFULEH WKH HQYLURQPHQWDO
7RUUDQFH DQ&RXQWLHV7L*HQWXG\ &RQG&RRUGLQD :LQG 3URMH
$UHD

- 1DWLRQDO 3DUN 6HUYLFH 3K\VLRJUDSKLF 3URYLQFHV 136
- 1DWLRQDO /DQG &RYHU 'DWDEDVH 1/&'
- 7KH 1DWLR&Q6D*6 0DS

&XUUHQW &RQGLWLRQV DQG 7UHQGV&RUR5QDJ:HHQDO 2YHU

6WXG\ &RUULGRU

7KHUHD ZK&RUHRQQHFWV VE GLYHUVH ZLWKLQ WKH *UHDW
SK\VLRJUDSKLF SURYLQFH 13H[WHQG 7KRQRUWK3RODQG WKH
ERUGHUHG WR WKH ZHVW EWWKH&KHEDVFN\ &RQQWDQQRQGV 7KH
VORSH GRZQZDUG WR WKH HDVW ZLWK PD[LPXP KHLJKWV LQ WK
GHFUHDVLQJWWR7KHUERFN LV KRUL]RQWDO EHGV RI VDQGVWRQHV
DQG OLJQLWH &RDO SHWUROHXP DQG QDWXUDO JDV DUH DOO
1DWLRQDO 3DUNV DQG 0RQXPHQWV RI WKH *U&HDYWU3QVDL1QWLRQ1DH
3DUN)RUW 8QLRQ 1DWLRQDO 0RQXPHQWV PHQWV&DRXHLRQ 9RKOHVDQ
ZLWKLQ R&RQUHDUD WKHG 3RUR&WRKHRQSDLHHQG\ &RUULGRU

1R QDWLRQDO SDNDWLQ PWKWWDKRUSDQDRVLWQ 7KHUFORVW QDWLRQ
LV 6DOLQDV 3XHEOR 0LVVLRQV 1DWLRQDO0RQXPHQW KZKFKFRVLHV
SDUN LV 6XPQHU /DNH 6WDWH 3DUN ZKLFK LV PRUH WKDQ PLO

&XUUHQW &RQGLWLRQV DQG 7UHQGV&RUULGRU:LGH 2YHU
3URMHFW $UHD

1R DGGLWLRQDO UHVRXUFHV&RQGLWLRQV:LWKLQ 3URMHFW $UHD

KDYH EHHQ UHFRUGHG&RQGXFWHG3XEOLVKHG WLPHO\ LQIRUPDWLRQ RQ WUDVK GXPSV RU UXLQV RI VWUXFWXUHV DVVRFLDWHG ZLWK UD

0LOLWDU\ $FWLYLWLHV

'DWD 6RXUFHV

7KH IROORZLQJ GDWD VRXUFHV:HUH UHYLHZHG

/LQFROQ&RXQW\ DQG&*RRGZDWHU&RQGLWLRQV 7L*HR6WXG\ &RUULGRU :LQG 3URMHFW $UHD

- 9)5 0DS 'LJLWDO HOHYDWLRQ P/&S FRP WRV KWPO
- 1HZ 0H[LFR 0LOLWDU\ %DVHV 0DSV PLOLWDU\HQV FRP QHZ

&XUUHQW &RQGLWLRQV DQG 7UHQGV*HQHUDO 2YHU
6WXG\ &RUULGRU

1R PLOLWDU\ EDVH&RUULGRU&RXQW\ :LQG 3URMHFW $UHD

LQWHU&RQQHFWLRQ 7L*HR6WXG\ (&RUULGRU:LGH 2YHUYLHZ

'HWHUPLQDWLRQ RI 1RW+D]DUGRXV 'LVSRVDO WUDQVPLVVLRQ HOHFWURP

WUDQVPLVVLRQ&RUULGRU &RXQW\ :LQG 3URMHFW $UHD

&XUUHQW &RQGLWLRQV DQG 7UHQGV&RQGLWLRQV 2YHU
3URMHFW $UHD

1R PLOLWDU\ EDVH&RUULGRU :LQG 3URMHFW $UHD

URXWHKLJKZD\WHU&RUULGRU :LQG 3URMHFW $UHD WKH QRUWKHDVW

GHYHORSPHQW 'HYRXORSPHQW IRU DQ\ WUDQVPLVVLRQ O

VWUXFWXUHHVHWRYHUDQVPLVVLRQ OLJKWH DVWHUXHWX&RUULGRU&RQGLWLRQV
3URMHFWV

5RDGV

'DWD 6RXUFHV

7KH IROORZLQJ GDWD VRXUFHV:HUH 7RUQDGR 7UXFN DQ

*XDGDO&RXSH&RXQW\ DQG&*RRGZDWHU&RQGLWLRQV 7L*HR6WXG\ &RUULGRU :LQG 3URMHFW $UH

x 1HZ 0H[LFR 'HSDUWPHQW RI 7UDQVSRUWDWLRQ 10'27

&XUUHQW &RQGLWLRQV DQG 7UH±&RUR5HJ7*HQ DO 2YHU
6WXG\ &RUULGRU
/LQFROQ 7RUUDQFH DQGU*XUDGDFRXSH&RXQWLHV QWUDO 1HZ 0H|
QHWZRUN RI VQGSHLYFRXQWDUDGDZ&RUHRQQHUR MZLFWVEH
GHYHO3RSWHGHUQ 'HZYHOORZSPHQWZLWK /10'27 DQG7RKUDGDFHXSDQG
&RXQW\ 5RDG 0DLQWHQDQFHW'HUSDLUWPHQW URDG FRQGLWLR
WR WKH VWDUW RI DQ\ FRQVWUXFWLRQ 6WDWHDQGWKWK
VHJPHQRXVURDGV WUD&RUURQHWLKHG 3URMHFWV

&XUUHQW &RQGLWLRQV 5HJLRQ7DH±&RUURQLHZLQG
3URMHFW $UHD
([LVWLQJ URDG FRQGLWLRQ:LQGWXUHMWKRVH $UHDWR WKRVH GHVFU
&RURQD7L*HQ WXG\ &RUULGRU

(19,5210(17$/ ())(&7

,QWURGXFWLRQ

7KLV FKDSWHUV ZKHW&RUQRQHL*HQHUDWLQJ6WDWLRQ V VZLWFK\DUG FRQVWUXFWLRQ RSHUDWLRQ DQG GHFRPPLVVLRQLQJ LPSDFWV RQ WKH HQYLURQPHQWDO UHVRXUFHV GLVFXVVHG LQ 106$) 3RWHQWLDO FRQVHTXHQFHV RQ WKH HQYLURQPHQW WKDW FRXOG UHVXOW IURP WKH ORFDWLRQ GHVFULEHG LQFOXGLQJ FRQVWUXFWLRQ DQG RSHUDWLRQ RI WKH SURSRVHG 6HFWLRQ &RPPLVVLRQ DSSURYHG &RUQRQHO 10$& LV DZDUGHG WR VDWLVI\ DGGLWLRQDO UHVRXUFH7KHUVHDVUHQHZDEOH\6WDWH RI&DOLIRUQLD UHVRXUFHV VZRDEWU UHVRXUFHV DQG VIRXWXUDO DQG KLVWRULF D UHVRXUFHV UHOLJLRXV DQG FHPHWHU\ VLWHV VRFLRHFRQRPLF VLJQDOV UDGLRDFWLYH ZDVWH DQG UDGLDJWLFKKLFDJRHUXUHFDPZDWHU SROLWDU\ DFWLYLWLHV,PSDFWGWDYHLYDWLRQV LRQG UHUDGLDWLRQ UHVRXUF FRQWH[WRRRUR\WLHHQGW[WG\W&RJHUWLKGRU3ZLWKDW FDQ KHOS PDQDJH L

,PSOHPHQWDWLRQDRQIVWKHVSEHQSRLVHGIWDFLOLWLHV FRXOG DIIHFW HQYLURQPHQW (IIHFWV FDQ RFFX&RGHQHGWHQ\RXG\LQHUHFWW\ ZHIIHFWV DUH WKRVH WKDW RFFXU WKURXJKGGWUEHQWPRVVLFRQHGLF IDFLOLWLHV ZLWK HQYLURQPHQWDO FRPSRQHQWV ,QGLUHFW HI WUDQVPLVVLRQ OLQH IDFLOLWLHV LQ WLPH VSDFH RU ERWK

6KRWWVWP LPSDFWV DUH FRQVLGHUHG WKRVH LPSDFWV WKDW RFF DQWLFLSDWHG WR UHWXUQ WR D SUHHQVWRXEWZRQJFRRQGLWLRQ (QYLURQPHQWDO HIIHFWV WKDWIZEXOKEHWDSSURSULDWH\[HRQ WR OH\HUV ZHUH FRQVLGHUHG LPSDFWV DUH WKRV UHPDLQ IRU WKH7LHEHWRQ *HQ

)RU HDFK UHVRXUFH DUHDGUHVVHFLHZESHRWOWRKZLVJURXSRQGLVWXE HQYLURQPHQWDO HIIHFWV WKDW PD\ RFFXU GXH WR WKH WUDQV PHDVXUHWKHW&RQWR :LSGR&RRPSHQVDWRU DQG PLQLPL]H LPSD SRWHQWLDOO\ QHJDWLYH LPSDFWV WR UHVXOW LQ XQGX YDOXHV

$LU 5HVRXUFHV

,PSDFW $VVHVVPHQW 0HWKRGV

$VVHVVPHQW RI LPSDFWV WR DLU UHVRXUFHV IURP WKH WUDQVP
PDLQWHQDQFH RSHUDWLRQV DQG GHFRPPLVVLRQLQJ RI WKH LPSDFW DVVHVVPHQW
GHVFULEHG LQ WKLV VHFWLRQ LV GLVFXVVHG EHORZ FRQVWUXFWLRQ
LPSDFWV DUH JHQHUDOO\ VKRUW WHUP DQG WHPSRUDU\ LQ QDW

,PSDFWV 6SHFLILF WR 7*LHQ 6WXG\ &RUULGRU

&RQVWUXFWLRQ

7KH ODUJH HTXLSPHQW XVHG GXULQJ FRQVWUXFWLRQ FRXOG FRQWULEXWH GLHVHO
FRPEXVWLEOHV LQFOXGLQJ JDVROLQH DQG GLHVHO RUJDQLF
FRPSRXQGV 92&V SDUWLFXODWH PDWWHU 2[1[DQG WUDFH DPRXQWV RI 6K
SROOXWDQWV &RQVWUXFWLRQ RFFXUULQJ GXULQJ GU\ ZHDWKHU
VWDQGDUGV ,I RQVLWH DFFHVV URDGV DUH QRW SURSHUO\ OL
SURSHU VWDWH DQG FRXQW\ UHJXODWLRQV GXVW FRQWURO SURFHGXUHV
SULRU WR FRQVWUXFWLRQ 7KHVH SUDFWLFHV PD\ LQFOXGH EXW
IDFLOLWLHV VKRXOG EH PDLQWDLQHG WR IXJLWLYH GXVW

)XJLWLYH GXVW DULVHV IURP ODQG FOHDULQJ JUDGLQJ H[FDYD
DPRXQW RI IXJLWLYH GXVW GHSHQGV RQ WKH FRQWHQW RI VLOW
FRQWHQW RI WKH VRLO DQG ZLQG VSHHG 'XULQJ GU\ SHULRGV
PRUH SUHYDOHQW WKDQ GXULQJ ZHW SHULRGV ZLWK ORZ ZLQGV
SODQQHG XVH LQ FRQVWUXFWLRQ]RQHV GXULQJ GU\ SHULRGV

$V WKH IXJLWLYH GXVW HPLVVLRQV DQWLFLSDWHG GXULQJ FRQ
WKH FRQVWUXFWLRQ SHULRG OLPLWHG WR WKH FRQVWUXFWLRQ D
ZDWHULQJ WZLFH GDLO\ RU DV QHFHVVDU\ FRQWUROV ZLOO EH
7LH 6WXG\ &RUULGRU

2SHUDWLRQDO ,QWHQDQFH

'XULQJ RSHUDWLRQ RI WKH WUDQVPLVVLRQ OLQH IDFLOLWLHV W
IURP ZRUNHU DQG PDLQWHQDQFH YHKLFOHV WUDYHOLQJ RQ
EH HPLVVLRQV GXH WR PDLQWHQDQFH 6XFK HPLVVLRQV DUH QRW DQ

WKHUHIRUHQRWDOO\SDFWVDUHVLJQLILFDQWO\GXULQJWKHRSHUDWLRQDO\HDUV

3URWHFWLRQ0HDVXUHV

3URWHFWLYHPHDVXUHVZLOOEHLPSOHPHQWHG WR UHGXFH ISURWHFWRQVLDFWLYLWLHV DFWLYLWLHVZLOOEHFRQGXFWHGLQDFFRUGDQFHZLWKDSSOLFDEOHUHJXODWLRQVDQGVWDQGDUGV IXHFRPEXVWLRQRQFHEUDNHVWRSSHGDQGLVVZLWFKHGRII ORFDO3UHVFULEHGHPHFKDQLVPVZLOOEHIROORZHG LQFOXGH

Air-1: 0DLQWDLQLQJ IDOOHGGHFRPSOLVWUXFWLRQ HTXLSPHQW LQ DFFRU UHFRPPHQGDWLRQV WRUHGXFHHPLVVLRQV

Air-2: &RQWUROOLQJ FRPEXVWLRQ HPLVVLRQV WKURXJK HQJLQH VRXUFHV DQG SRUWDEOH HTXLSPHQW VXFK DV DLU FRPSU

Air-3: /LPLWLQJ WKH HQGDQJHUHG VSHFLHV XQOHVV LGOLQJ PXVW EH PD H J GULOOLQJ KRLVWLQJ DQG WUHQFKLQJ

Air-4: /LPLW WKH SHHG RI YHKLFOHV ZLWKLQ FRQVWUXFWLRQ V FRQVWUXFWLRQ WR UHGXFH GXVW HPLVVLRQV

Air-5: :DWHU WUXFNV DZQGHEVHDXWLOWR]HGGXFH IXJLWLYH GXVW

&RQFOXVLRQ

&RQVLGHUHGLQLPLWHG DQG WUDQVLHQW QDWXUH RI HPLVVLRQV U PDLQWHQDQFHDQGWUDQVPLVVLRQ OLQH IDFLOLWLHV DV ZHOO DV WKH H[SHFWHG WKDW WKH SURSRVHG ORFDWLRQ RI WKH WUDQVPLVV

1RLVH

,PSDFW $VVHVVPHQW 0HWKRGV

$VVHVVPHQW RI FRQVWUXFWLRQ RSHUDWLRQV DQG PDLQWHQDQFH OLQH IDFLOLW\ PDLQWHQDQFHDFWLYLWLHV IROORZV WKH PHWKRGRORJ\GHVFULEHGEHORZ DQG LV GLVFXVVHG EHORZ &RQVWUX PDLQWHQDQFH LPSDFWV DUH JHQHUDOO\URXWLQHDQG VKRUW WHUP DQ

,PSDFWV 6FSWHRLWRKUHRQD7*LHQ6WXG\ &RUULGRU

7KH H[LVWLQJ QR&RVUHRQHHY*HQWRXQWZKLSDUWLQFRQ 7RUUDQF
DQG *XDGDOXSH&RXQWLHV ORZ 7KH SULPDU\&RQWHQWRXUH
6WXG\ &RUULGRU IILF DORQJ ORFDO FRXQW\ URDGZQRGHVRPH DJ
DVVRFLDWHG ZLWK HTXLSPHQW RSHUDWLRQ GXULQJ FRQVWUXFWLR
QRLVH OHYHOVZLOGOLIH*WXG\ &RUULGRUIURP FRQVWUXFWLR
IDFLOLWLHV VKRUWHUP DQG*SHFLHV VWDWH DQG
UHJXODWRU\ FRPSOLHG ZLWK $IWHU FRQVWUXFWLRQ RSHUDWLO
IDFLOLWLHV JUHDWO\ UHGXFH QHJOLJLEOH LPSDFWV

3URWHFWLWLDQXUHV

3URWHFWLRQZRXOGEHXUHVWULFWHG WR UHGXFH DQ\ SRWHQWLDO
FRQVWUXFWLRQ DFWLYLWLHV LQFOXGH

Noise-1: 5HVWULFW FRQVWUXFWLRQ DFWLYLW\ QHDU UHVLGHQFHV

Noise-2: $XGLEOH QRLVH GXH WR ZLQG HQHUJ\ IDFLOLW\ RSHUDWL
SHULRG RI WLPH ZKHQ PHDVXUHG DW DQ\ RFFXSLHG UHVL
OLEUDU\ H[LVWLQJ RQ WKH GDWH RI DSSURYDO RI WKH ZL

&RQFOXVLRQ

%DVHG RQ ORFDOL]HG ORZ VKRUW WHUP LPSDFWV FRPSOLDQF
QHJOLJLEOH LPSDFWV GXULQJ RSHUDWLRQ DV ZHOO DV WKH SU
WKDW WKH SURSRVHGQV FLVWUXFWLRQRQLRHWLWLHV ZRXOG XQGXO

*HRORJ\ DQG 0LQHUDO 5HVRXUFHV

,PSDFW $VVHVVPHQW 0HWKRGV

$VVHVVPHQW RI LPSDFWV WR JHRORJLFDO DQG SDOHRQWRORJLF
FRQVWUXFWLRQ RSHUDWLRQ0DLQWHQDQFHDQG'HFRPPLVVLRQLQJ LPSDF
DVVHVVPHQW PHWKRGRORJLHV ZHUH GHYHORSHG EHORZ

,PSDFWV 6FSWHRLWRKUHRQD7*LHQ6WXG\ &RUULGRU

7KHUH DUH QR LGHQWLILHG RSHUDWLRQDO RU GHFRPPLVVLRQLQJ
&RURQD7L*HQ6WXG\ &RUULGRUV IURP WKH FRQVWUXFWLRQ RSHU
WUDQVPLVVLRQ OLQH IDFLOLWLHV DUH QRW DQWLFLSDWHG 7KH

*HQHUDWH6WXG\ &RQVWUXFWLRQ RSHUDWLRQV IURP WKH FRQVWUXFWLRQ RSHUDWLRQ OLQH IDFLOLWLHV DUH QRW DQWLFLSDWHG

3URWHFWHGWDQG5DUH6SHFLHV

1R SURWHFWHG PHDVXUHV DUH QHHGHG IRU JHRORJ\ UHVRXUFH IHDWXUHV RU ODQGVFDSHV LQ/LQHU7UDQVPLVVLRQ

&RQFOXVLRQ

'XH WR QR XQLTXH JHRORJLFDO FRQGLWLRQV RU SURWHFWHG IHDWXUHV RQ WKH SURSRVHG SURSRVHG DFWLYLWLHV IRU WKH WUDQVPLVVLRQ OLQH IDFLOLWLHV ZRXOG XQGXO\ LPSDLU JHROR

6RLO 5HVRXUFHV

,PSDFW $VVHVVPHQW 0HWKRGV

$VVHVVPHQWV RI SRWHQWLDO LPSDFWV WR VRLO UHVRXUFHV IURP WKH WUDQVPLVVLRQ DQG PDLQWHQDQFH RSHUDWLRQV RI WKH LPSDFW DVVHVVPHQW GHVFULEHG EHORZ DQG LV GLVFXVVHG LQ GHWDLO LQ WKH HQYLURQPHQWDO FRQVHTXHQFHV LPSDFWV DUH JHQHUDOO\ ORZ VKRUW WHUP DQG WHPSRUDU\ LPSDFWV RQ VRLO ZRXOG EH ORVW GXH WR WKH SHUPDQHQW IRRW

,PSDFWV 6SHFLILF WR*HQHUDWLQJ 6WXG\ &RUULGRU

&RQVWUXFWLRQ DFWLYLWLHV DIIHFWLQJ VRLO UHVRXUFHV LQFOXGH GLVWXUEDQFH DQG FRPSDFWLRQ RI VRLOV DW SHUPDQHQW URDGV DQG VSOLFLQJ VLWHV FRQVWUXFWXUH SZRUNLQJ DQG VWRUDJH DUHDV

7HPSRUDU\ (URVLRQ

*URXQG GLVWXUEDQFH GXULQJ FRQVWUXFWLRQ PD\ H[SRVH VRLO WR WHPSRUDU\ HURVLRQ SURWHFWLYH YHJHWDWLRQ PD\ H[SRVH VRLO WR SRWHQWLDO ZLQG *HQHUDWH 6WXG\&RUULGRU VHQVLWLYH WR VRLO HURVLRQ LPSDFWV ZDWHU HURVLRQ DQG ZLQG HURVLRQ RQ EDUH VRLOV

3RWHQWLDO HURVLRQDO HIIHFWV IURP WKH WUDQVPLVVLRQ OLQH FHFHVVDU\QWRKHDWQVPLVVLRQ OLQH IDFLOLWLHV LQ ZRUNLQJ 3RWHQWLDO%03V LQFOXGLQJ HURVLRQ DQG VHGLPHQW FRQWURO PLJKW UHTXLUH LQVSHFWLRQ PDLQWHQDQFH DQG UHSDLU

OLQH IDFLOLWLHV WR UHGXFH VRLO HURVLRQ RU VHGLPHQWDWL
RSHUDWLRQV ZRXOG EH VHHGHG ZLWK D QDWLYH JUDVV PL[DQ
VXUIDFH RHV HG WR HURVLYH FRQGLWLRQV

7KH DUHDV XVHG IRU FRQVWUXFWLRQ ZRXOG EH UHFODLPHG DV
RULJLQDO ODQG FRQWRXUV WRSVRLO UHSODFHPHQW DQG UHYH
3UHYHQWLRQ3²3 ODQ WR 6WRUP ZDWHU PDQDJHPHQW SURJUDP IURP WKH
$JHQF\ XQGHU 1DWLRQDO 3ROOXWDQW 'LVFKDUJH (OLPLQDWLRQ
UHVR²XDQFH EHVXVH RI DSSURSULDWH VRLO PLWLJDWLRQ PHDVXUHV D
HURVLRQ

$FFLGHQWDO 6SLOOV

'XULQJ FRQVWUXFWLRQ XVH RI WUXFNV KHDY\ HTXLSPHQW DQ
GLVFKDUJH RI IXHO OXEULFDQWV DQG DXWRPRWLYH IOXLGV $
DFFLGHQWDO RHFGRLOQPLWHG H[WHQW DQG ZRXOG EH FRQVLGL
LQ GXUDWLRQ %03V IRU FRQVWUXFWLRQ KRXVHNHHSLQJ VSLOO
DQG UHPHGLDWH DFFLGHQWDO VSL[QHW UHVXOWLQJ ZDHUHPHGLD
HIIHFWRVLOVR

3HUPDQHQW 6RLO /RVV

7KH DUHD ZLWKLQ WKH IRRWSULQW RI WKH WUDQVPLVVLRQ RLOH
DFUHDJH WR RWKHU SURGXFWLYH VRLO WXUEHV WKHLUHQWLDO
UDQJH IURPDSSUR[LPU &RXQW\ &RPPLVVLRQHUV &RXUW
RQWHQWSKHEFHQW&RRQVWUXFWHG WXG\ &RUULGRU

3URWHFWLRQ 0HDVXUHV

3URWHFWLRQZRHDVXUHV WR UHGXFH DQ\ SRWHQWLDO
FRQVWUXFWLRQ DFWLYLWLHV LQFOXGH

Soil-1: &RQVWUXFWLRQ FUHZV ZLOO UHGXFH WKH DPRXQW RI VRL
WLUHV DQG ZLGHU WLUHV WR GLVWULEXWH WKH ZHLJKW
DUHDV DIWHU FRQVWUXFWLRQ LV FRPSOHWHG RU XVLQJ J

Soil-2: 7R WKH H[WHQW SRVVLEOH WRSVRLO ZLOO EH UHPRYHG
H[FDYDWLRQ DQG 3ODQW WRSVRLO UHSODFH VRLW RQ
SUHVHUYH WRSVRLO

Soil-3: 3DWWHUQ 'HYLHOORSPHQW HURVLRQ E\ DSSO\LQJ DQG PDLQ
VHGLPHQW FRQWURO PHWKRGV 7KHVH PHDVXUHV DUH GHVLJQHG WR
EDUULHUV GLWFKHV ZRXOG EH SODFHG DW FRQVWUXFWLRQ
ZRXOG EH GLVWXUEHG DORQJ 6WHHS VORSHV ZRXOG DOVR
PHDVXUHV DQG ORFDWLRQV ZLOO EH VSHFLILHG LQ D 6:33

&RQFOXVLRQ

%DVHG RQ WKH PLQLPL]H DQG VWDELOL]H GLVWXUEHG VRLOV %03
DERYH WHUPDQHQW DQG WHPSRUDU\ LPSDFWV WR VRLOV GXULQJ
ORFDWLRQ DQG PDLQWHQDQFH RI WKH SURSRVHG

3DOHRQWRORJLFDO

,PSDFW $VVHVVPHQW 0HWKRGV

$VVHVVPHQW RI LPSDFWV WR SDOHRQWRORJLFDO UHVRXUFHV IU
RSHUDWLRQ DQG PDLQWHQDQFH DFWLYLWLHV WKDW PD\ DIIHFW SDOHRQWRORJL
XVDJH DQG WUHQFKLQJ DQG WUHQFKLQJ IRU XWLOLWLHV *UDG
LPSDFW SDOHRQWRORJLFDO UHVRXUFHV RI 3HUP
$QGUHDV)RUPDWLRQ *ORULHWD VDQGVWRQH DQG
ORZ SUREDELOLW\ IRUPDWLRQV ZKHUH H[FDYDW
VLWH SUHSDUDWLRQ DQG FRQVWUXFWLRQ ZRXOG KDYH SRWHQW
SUHVHQW WKHUHIRUH &RQVWUXFWLRQ DQG 2SHUDWLRQV &RQVWUXFWLRQ
GLVFRYHULHV ZKLFK PD\ RFFXU GXULQJ FRQVWUXFWLRQ ZRXOG

3URWHFWLRQ 0HDVXUHV

3URWHFWLRQ ZRXOG EH LPSOHPHQWHG WR UHGXFH DQ\ SRWHQWLDO
FRQVWUXFWLRQ DFWLYLWLHV LQFOXGH

Paleo-1:)ROORZ D 8'3 SURYLGLQJ SURWHFWLRQ IRU XQNQRZQ VLJ

&RQFOXVLRQ

'XH WR WKH ORZ SUREDELOLW\ IRU WKH SUHVHQFH RI WKH SDOHRQWRORJLF
JURXQG GLVWXUEDQFH DFWLYLWLHV ZRXOG EH FRPSOHWHG SULI
LW LV QRW H[SHFWHG WKDW WKH SURSRVHG ORFDWLRQ RI WKH
SDOHRQWRORJLFDO V

:DWHU 5HVRXUFHV

0HWKRGV DQG ,PSDFW 7\SHV

$VVHVVPHQW RI LPSDFWV WR ZDWHU UHVRXUFHV IURP WUDQVPL
PDLQWHQDQFH RI WKH &RURQD :LQG 3URMHFWV ... WKH LPSDFW DVVHVVPHQ
GHVFULEHG DERYH DQG LV GLVFXVVHG EHORZ &RQVWUXFWLRQ
LPSDFWV DUH JHQHUDOO\ ORZ DYRLGDEOH VKRUW WHUP DQG

,PSDFWV 6SHFLILF WR WKH &RURQD :LQG 6WXG\ &RUULGRU

6XUIDFH :DWHU

7KH SRWHQWLDO VRXUFHV RI VXUIDFH ZDWHU UHVRXUFH LPSDFWV
SHUPDQHQW DQG WHPSRUDU\ GLVWXUEDQFH DFWLYLWLHV VXFK DV
DQG VSOLFLQJ VLWHV ... DV ZHOO DV
VSOLOOV RI KD]DUGRXV PDWHULDOV ...
HURVLRQ RU ZDWHU UXQRII ...
VXVSHQGHG VHGLPHQWV ZLWKLQ DGMDFHQW ZDWHUERGLHV DQG
ZDVK LQWR DQG SROOXWH ... VPDOO JUR
GLVWXUEDQFH DUHD DPRXQW ... &RUULGRU
ORZ LPSDFWV WR VXUIDFH ZDWHU DUH DQWLFLSDWHG IURP WKH

,Q DGGLWLRQ WR WKH DERYH DFWLYLWLHV LPSDFWV WR VXUIDFH ZD
WUDQVPLVVLRQ OLQH ... WUDQVPLV
LQGLYLGXDO ... :0
DYRLG SRWHQWLDO LPSDFWV V ...
KRZHYHU QHZ VWUHDP FURVVLQJV PD\ EH UHTXLUHG LQ FHUWDL
WKURXJK WKH DSSOLFDEOH DJHQFLHV /RZ LPSDFWV WR VWUHDP
EDVHG RQ ... DELOLW\ WR D
UHVRXUFHV WKURXJK DHULDO VSDQQLQJ

6WRUPZDWHU5XQRII3RWHQWLDO GXULQJ FRQVWUXFWLRQ WR UHGXFH SRWHQWLDO VHGLPHQWDWLRQ DQG WXUELGLW\ LPSDFWV GXULQJ FRQVWUXFWLRQ DQG LPSOHPHQWHG IRU WKH WUDQVPLVVLRQ OLQH FRQVLVWHQW ZLWK SHUPLW UHTXLUHPHQWV 'HSDUWPHQW 6XUIDFH :10('6:4% 7KH 6:3337 UHTXLUHV WKH GHYHORSPHQW RI D VWRUPZDWHU SROOXWLRQ SUHYHQWLRQ DQG &RQWURO 3ODQ 6:3337 WKDW GHVFULEHV WKH SURSRVHG FRQVWUXFWLRQ DFWLYLWLHV DQG DVVRFLDWHG EHVW PDQDJHPHQW SUDFWLFHV %03V WR EH LPSOHPHQWHG WR FRQWURO SROOXWDQWV LQ VWRUPZDWHU UXQRII DQG WR PLQLPL]H WKH SRWHQWLDO IRU HURVLRQ DQG VHGLPHQWDWLRQ DW FRQVWUXFWLRQ VLWHV ,Q DGGLWLRQ WKH 6:3337 ZLOO LGHQWLI\ WKH SHUVRQ RU SHUVRQV UHVSRQVLEOH IRU LPSOHPHQWDWLRQ DQG PDLQWHQDQFH RI WKH %03V DQG WKH SURFHGXUHV IRU LQVSHFWLRQ DQG PDLQWHQDQFH RI WKH %03V

)ORRGSODLQV

,W LV UHDVRQDEOH WR DVVXPH WKDW DOO ZDWHUERUQH SROOXWDQWV WKDW)(0$ DVVRFLDWHG ZLWK WKH SURSRVHG FRQVWUXFWLRQ DUHDV SUHVHQW WR DQ\ IORRGSODLQ DUHDV ZLOO EH GLOXWHG DQG GLVSHUVHG WR OHYHOV WKDW DUH QRW KD]DUGRXV WR KXPDQ KHDOWK DQG WKH HQYLURQPHQW

*URXQGZDWHU

,W LV XQOLNHO\ WKDW WUDQVPLVVLRQ OLQH IDFLOLWLHV ZRXOG EH FRQVWUXFWHG LQ JURXQGZDWHU ZRXOG EH ORZ LPSDFW ([FDYDWLRQV IRU WUDQVPLVVLRQ OLQH IRXQGDWLRQV ZRXOG EH VKDOORZ DQG FRQWDFW ZRXOG EH XQOLNHO\ WR GHYHORS LQWR D SHUPDQHQW LQIOXHQFH WKDW FRXOG DIIHFW JURXQGZDWHU IORZ RU TXDOLW\ LQ D WLPHO\ PDQQHU

1R ZDWHU ZHOOV ZRXOG EH GULOOHG IRU WKH WUDQVPLVVLRQ OLQH 'XVW FRQWURO RU ZHWWLQJ PHWKRGV VKDOO EH XVHG GXULQJ FRQVWUXFWLRQ DQG GHFXUHG SULRU WR FRQVWUXFWLRQ

:HWODQGV

$ GHVNWRS DVVHVVPHQW XWLOL]LQJ H[LVWLQJ PDS DQG GDWD SRWHQWLDOO\ MXULVGLFWLRQDO ZHWODQGV WKDW FRXOG EH FRQVWUXFWHG WR DGGUHVV FRPSOLDQFH ZLWK 6HFWLRQ DQG 6HFWLRQ RI WKH 1RQ[LRXV 6SHFLHV &RQWURO DQG 0DQDJHPHQW $FW &RQVWUXFWLRQ &RQWURO 0HDVXUHV DQG 5HVWRUDWLRQ URDGV DV FXUUHQWO\ QR 6HFWLRQ SHUPLW 6HFWLRQ SHUPLW RU 6HFWLRQ ZD

,W LV QRSWHG WKDW WKH SURSRVHG &RURQD :LQG SURMHFWV VHYHUDO HSKHPHUDO VWUHDPV SURSRVHG DFFHVV &RUURGRU :LQG SURMHFW KRZHYHU ILH LQYHVWLJDWLRQV WKDW GHWHUPLQHG WKDW WKHVH SKHQRPHQD WKH H[KLELWHG D GHILQ 2+:0 DQG ZHUH YHJHWDWHG ZLWK WKH VDPH VSHFLHV DV RFFXU 2+:0 RU ZHWODQG YHJHWDWLRQ LQGLFDWLYH RI 8D6 :2786 %DVHG RQ WKH ODFN RI DKQ2U.RSHQVLFWKHJHDFWRQ WKH GUDLQDJHV DQG WKH 2786 TXDOLWDWLYH HQYLURQPHQWDO DVVHVVPHQW RI WKH &OHDQ :DWHU $FW DYRLGDQFH %03V DUH LPSOHPHQWH :2786 VWDWXV

7KH SRWHQWLDO ZHWODQGV LGHQWLILHG:,QQWKH HQVXLQJ GHOLQHDWHG WR GHWHUPLQH WKH DFWXDO ORFDWLRQV RI ZHW IDFLOLWLHV 7KRXJKRXW WKH GHVLJQ SURFHVV WKH GHVLJQV WHDP VR GLUHFW LPSDFW DYRLGHG $OO ZHWODQGV ZRXOG EH DYRLGHG RU VSDQQHG E\ W 6XEVWDWLRQV DQG VZLWFK\DUGV ZRXOG QRW EH ORFDWHG LQ Z WQVLRQLZRXOGEHWHG WR DYRLG ZHWODQGV WKHDQG RQ WEH PDWWLQJ DQG RWKHU WHPSRUDU\ GLVWXUEDQFHV ZRXOG 1R SHUPDQHQW ORVV RI ZHWODQGV UHVXOWLQJ IROORZLQJ SURWHFWLRQ PHDVXUHV

3URWHFWLRQ

3URWHFWLRQ PHDVXUHV LQFOXGH SHUPDQHQW WUDQVPLVVLRQ WRZHU UHVWULFWLRQ DFWLYLWLHV LQFOXGH

Water-1: 'HYHORS DQG LPSOHPHQW D 6:333 7KH 6:333 ZLOO LQFO IHQFHV WR FRQWURO UXQRII VHGLPHQW WUDSSLQJ EDVI WHPSRUDU\ DQG SHUPDQHQW VHHGLQJ DQG PXOFKLQJ

Water-2: 'LVWXUEHG DUHDV ZLWKLQ WHPSRUDU\ FRQVWUXFWLRQ DUHDV WR WKH H[W PL[DQG VHHGLQJ UDWHV ZLOO EH GHYHORSHG WKURXJK F ODQGRZQHU HQJDJHPHQW

Water-3: (TXLSPHQW ZLOO EH SURSHUO\ PDLQWDLQHG

Water-4:)XHOV DQG SHWURROHXP ZLOO EH VWRUHG DZD\ IURP H[FD

Water 5: 6SLOOV ZLOO EH FOHDQHG XS LPPHGLDWHO\

Water-6: 0DWWLQJ DQG RWKHU WHPSRUDU\ GHZDWHULQJ HTXLSPHQW VKDOO EH XVHG DV QHHGHG DQG VXVSHQGHG DQG GLVSRVHG RI DV DSSURSULDWH DQG DFFRUGLQJ WR PDQXIDFWXUHUV¶ UHFRPPHQGDWLRQV DQG DSSOLFDEOH UHJXODWLRQV DYRLGHG

Water-7: ,PSDFWV ZLOO EH HYDOXDWHG DJDLQVW WKH UHTXLUHPHQWV RI WKH 1DWLRQZLGH 3HUPLW 1:3

Water-8: (VWDEOLVK DQ DSSURSULDWH EXMHFWLYH UHTXLUHPHQW RU GHVLJQ FULWHULRQ GHVFULEHG LQ WHUPV RI WKH EHVW WHFKQRORJ\ DYDLODEOH WR PLQLPL]H DGYHUVH LPSDFWV WR WKH DTXDWLF HFRV\VWHP WR WKH H[WHQW DSSOLFDEOH DQG DSSURSULDWH

&RQFOXVLRQ

%DVHG RQ WKH OLPLWHG DPRXQW RI ZHWODQG DQG VWUHDP LPSDFWV DQWLFLSDWHG DQG WKH UHODWLYHO\ VKRUW GXUDWLRQ RI FRQVWUXFWLRQ DFWLYLWLHV WKH LPSDFWV WR ZDWHU UHVRXUFHV E\ WUDQVPLVVLRQ OLQH DQG VXEVWDWLRQ IDFLOLWLHV DUH H[SHFWHG WR EH VPDOO DQG QRW VLJQLILFDQW 7KH LPSOHPHQWDWLRQ RI WKH SURSRVHG PLWLJDWLRQ PHDVXUHV DQG EHVW PDQDJHPHQW SUDFWLFHV ZRXOG IXUWKHU UHGXFH SRWHQWLDO LPSDFWV WR ZDWHU UHVRXUFHV

)ORUD DQG)DXQD

0HWKRGV DQG ,PSDFW 7\SHV

$VVHVVPHQW RI LPSDFWV WR ELRORJLFDO UHVRXUFHV IURP WKH DQG PDLQWHQDQFH RSHUDWLRQV ZDV FRQGXFWHG E\ RSHQ JUDVVODQG JUD]LQJ DGDSWHG WR VKRUWZLUHG NLQJELUG DQG VPDOO PDPPDO VSHFLHV 7KH DVVHVVPHQW GHVFULEHG EHORZ SURYLGHV D PRUH GHWDLOHG DQDO\VLV RI WKH LPSDFWV WR WKH PRVW VHQVLWLYH ELRORJLFDO UHVRXUFHV

,PSDFWV 6SHFLILF WR WKH 6WXG\ &RUULGRU

7KH &RURQD 7L*HQ 6WXG\ &RUULGRU LV GHILQHG E\ RSHQ JUDVVODQG JUD]LQJ DGDSWHG WR VKRUWZLUHG NLQJELUG DQG VPDOO PDPPDO VSHFLHV 7KH DVVHVVPHQW RI LPSDFWV WR ELRORJLFDO UHVRXUFHV IURP WKH DUHD LQ ZKLFK FRQVWUXFWLRQ LV RFFXUULQJ 0RVW RI WKH ZLOGOLIH PRYHPHQWV ZRXOG EH H[SHFWHG WR RFFXU DW RU QHDU WKH JURXQG OHYHO DQG WKH LPSDFWV RI FRQVWUXFWLRQ DFWLYLWLHV DUH H[SHFWHG WR EH OLPLWHG WR WKH LPPHGLDWH DUHD DURXQG WKH FRQVWUXFWLRQ IURP KDELWDW SRWHQWLDOO\ XVHG E\ WKH VSHFLHV 'HYHORSPHQW RI WKH SURSRVHG PLWLJDWLRQ SODQ ZLOO IXUWKHU UHGXFH SRWHQWLDO LPSDFWV WR WKH VSHFLHV DQG WKHLU KDELWDW 7KH SURSRVHG PLWLJDWLRQ LQFOXGHV WKH SODQWLQJ RI QDWLYH JUDVVHV DQG IRUEV WKDW DUH SUHIHUUHG IRRG VRXUFHV IRU WKH VSHFLHV DQG WKH LPSOHPHQWDWLRQ RI EHVW PDQDJHPHQW SUDFWLFHV GXULQJ WKH RSHUDWLRQV SKDVH RI WKH SURMHFW

DFWLYLWLHV PLJKW DOVR LPSDFW SODQWV DQG VPDOO LPPREL
WKURXJK GLUHFW LPSDFW DRU KDELWDW DOWHUDWLRQ DV GHVFULEHG DERYH
GXH WR HTXLSPHQW RU YHKLFXODU PRYHPHQW RQ WKH 52: RU G
LV IRVVRULDO 3RWHQWLDO LPSDFWV RI WKH SURSRVHG LQGXVWULDO 3RN
OHYHO LPSDFWV DUH QRW OLNHO\ 7KHUHIRUH ORZ LPSDFWV WR
GLVWXUEDQFH DQG ORFDOL]HG SRWHQWLDO IRU GLUHFW PRUWD

)HGHUDOO\ DQG 6WDWH /LVWHG 6SHFLHV

)LYHQLPDO VSHFLHVHVH1HWKHUODQGVH 3HDWWHUSRUXQ WSHFLHVFDQG
RZO1RUWKHUQ DSODQGDVKWHZEHUDFKHU IHGHUDOO\ OLVWHG X
SRWHQWLDO KDELWDW RI WKH EDL*HG\ &(RU7UL ERU7WKHVHWHUQ ZLOORZ
IO\FDWFKHU GHQRWHV3HPxDQVFDUH XQLNH&RUWRQ:EXQG ZHUWKHQWWK H
DEVHQFH RI VX7KWDEOHLVKDLPLLWDHG SRWHQWLDO IRU WKH 0H[FDQ
&RURQD ¶3UREHVWHWGKDU1HZ 0H[DGRZSLQJXVH LV XQLNHO\ WR RFF
UHTXLUHV VSHFLDOL]HG ZHWODQG KDELWDW QHDU VHDVRQDO R

$ WRWDOWHDLWHG HQGDQJHUHG RU WKUHDWHQHGZLZKGHOLHHWKSH
&RURQD :LQG3URMHFWV'(LR)ORSHGQG GHVFULEHG DERYWKLHQVHFW
VSHFLHV EDOWG VHDJUHZ%DSLHUGHJULQH IDFRQ &RQGRQVSRWQHG
7LH 6WXG\D&RUJUDEXWVXLWDEQRWKDSEULWDQWL7&(RU7RQD7L*HQ
6WXG\ &RVUFXGURUHQWO\ GRPLQDWHG E\ JUD]HG VKRUWJUDVV SUD
GXH WR ODQG XVH SUDFWLFHV ,I DQ\ VSHFLHV RU VXLWDEOH KD
LGHQWLILHG GXU1DWWHUEOHYXXRGSWKHQW FRRUGLQDWH ZLWK 86)
10'*) WR GHWHUPLQH DYRLGDQFH RU PLQLPL]DWLRQ VWUDWHJLH
SURMHFWVHFLHV ZRXOGRHORZSRWHQWLDO IRU VSHFLHV RFFXUUHQ
TXDOLW\ RI VSHFLDHQGKDEWDWFSQHWHQWLRQ GXUDWLRQ IRU WU
&RURQD7L*HQ6WXG\ &RUULGRU

2QH VSHFLDO VWDWXV S¶DKQHGJRSXRXOLRQ&XUHQQWHQ
6WXG\ &RKHZHRSDF WR VSHFLDO VWDWXV SODQW VPHFLHV IU
ZRXOG EH PLQLPDO EDVHG RQ WKH ORZ OLNHOLKRRGDHVSHFLD
'LVWXUEDQG JURXQG ZRXOG EH UHVWRUHG DV FORVH WR SUHFRQVWU
DSSURYHG QDWLYH VHHG PL[HV DQG QR[LRXV ZHHG FRQWURO

5DSWRUV (DQJGH%LUGV

5DSWRU HDJOH DQG PLJUDWRU\ &ERUURGQVW1HWQXHGV R RHWUNGRZQ WR EUHHGLQJ IRUDJLQJ DQG PLJUDWLRQ OLQH IDFLOLW\ ELUG QHVWLQJ VHDVRQ SRWHQWLDO LPSDFWV FRXOG RFFXU WR QRLVH DQG HTXLSPHQW\HDU RXWDJH FRQVWUXFWLRQ FRXOG DOVR DFWLYLWLHV RI ELUG VSHF3LDWWQHUQWLHQUHSRVRSHWQDWRHPSOHDWR DQG FRQVWUXFWLRQ DFWLYLDQGHVLQWHUJXWKWRWHQWLDOLP\S\ $FW 0%73HRQVWUXFWLRQ 0%7$ VXUYH3\WZRXOG 'HDQHRSHQWG FRQVWUXFWLRQ DFWLYLWLHV ZRXOG RFFXU RXWVLGH RI EUHHGL)XUWKHUPRUH LQ DF(3RSU3GDWQWHUZLWKRWRHQSODFLQJ WUDQVP IDFLOLWLHV QHDU DFWLYH HDZJRXHOGWRXEH &RQWWHUGXFWRQV DIHWG DFWLYH QHVW 1HVW LGHQWLDLQHGXUHVQHUSHLQRRQGGWHKFWDJ IRU DQ HVWDEOLVKHG SURWHFWLRQ EXIIHU

7UDQVPLVVLRQ OLQH IDFLOLWLHV FDQ SUHVHQW DGGLWLRQDO K +RZHYHU QR HOHFWURFXWLRQ ULVN WNR9 SWHUDFKLPLJVEVLLURGQVOZLRQHO SKDWSKDVH DQGRUSKDQGF OHDUDQF3HRWHQWLDO ZDWHU UHVRXUFH VFDWSWHDUEGVDWRFN SRQGV UDQGWHSKWFPDUDEOHGLQXQGDWHG GXULQ QXPEHU RI ELUGV PD\ PLJUDWH WKURXJK WKH DUHD EXW IHZ ZD RYHUKHDG OLZRXBHGFXOL&RURQQVEL*HQWXG\ &(R7ULGR&UROOLVLRQ ULVNV WR FUDQHV ZRXOG RQO\ DSSO\ GXULQJ ZHW SHULRGV GXU ELUGV PD\ GHVFHQG RU DVFHQG WR DFFHVV VWRSRYHU KDELWDV

3DWWHUQ 'HYHORSPHQW 3RZHU /LQH ,QW$3UDFWLFDO&RQ&RPPLWWHH LPSOHPHQW PHWKRGRORJLHV FROOLVLRQ UDLVN HZLWFKSURWHFWLRQ OLQHV WUDQVPLVVLRQ OLQH HQJLQHHULQJ GHVLJQ 7KH HOHFWURFXWL HQJLQHHULQJ GHVLJQ GLVWDQFHEWRZHUXFWXUHV &RQGXFWRU WKH SURSRVHG WUDQVPLVVLRQ OLQH LV JUHDWHU WKDQ WKH ZL JUHDWHUHWKDQKLOH WKH FRQGXFWRUV DUH W\SLFDOO\ KLFN H IOLJKW WKH VKLHOG ZLUH XSSHU PRVW ZLUH LV WKLQQHU DQ JUHDWHUQHLVN ZHWJODQGV 3RWDWLDO 'HZKDELWDW ELUG GLYH PLQLPL]H FROOLVLRQ HQYLURQPHQWDO IRU DYLD

3URWHFWLRQ 0HDVXUHV

3UR WHFWLRQ ZRXOG EH XQGHUWDNHQ WR UHGXFH DQ\ SRWHQWLDO LPSDFWV IURP FRQVWUXFWLRQ DFWLYLWLHV LQFOXGH

Bio-1: 3URSHUO\ GLVSRVLQJ RI WUDVK DQG IRRG GHEULV LQ VHF

Bio-2: $OORZLQJ ZLOGOLIH WKDW KDV HQWHUHG WKH ZRUN DUHD

Bio-3: 3URYLGLQJ HQYLURQPHQWDO DZDUHQHVV WUDLQLQJ WR D 3UR MHFW

Bio-4 &KHFNLQJ IRU ZLOGOLIH XQGHU YHKLFOHV DQG HTXLSPHQ KRXU DQG HDFK PRUQLQJ SULRU WR PRYLQJ RU RSHUDWL

Bio-5 &KHFNLQJ WUHQFKHV H[FDYDWLRQV DQG XQFDSSHG SLSH

Bio-6 &RPSO\LQJ ZLWK GSRVLWHG VS

Bio-7 &RQGXFWLQJ WUHH YHJHWDWLRQ FOHDULQJ RXWVLGH WKH ELUGV IURP HVWDEOLVKLQJ QHVWV DQG

Bio-8 &RQGXFWLQJ VXUYH\V SULRU WR FRQVWUXFWLRQ QHVW VXUYH\V LQLWLD YHJHWDWLRQ FOHDULQJ KDV EHHQ FRPSOHWHG SULRU WR

Bio-9 (VWDEOLVKLQJ DQ DSSURSULDWH EXIIHU]RQH DURXQG RFF GLVWXUEDQFH

Bio-10 'HVLJQ WUDQVPLVVLRQ OLQH IDFLOLWLHV WR DYRLG SRWHQWLDO HOHFWURFXWLRQ DQG FROOLVLRQ ULVN

Bio-11 0LFURVLWLQJ ZLOO EH FRPSOHWHG GXULQJ HQJLQHHULQJ UHVRXUFHV

Bio-12 6HWEDFNV IURP VHQVLWLYH ELRORJLFDO UHVRXUFHV DQG WLPH FULWLFDO SHULRGV

Bio-13 ,QVWDOO ELUG GLYHUWHUV QHDU UDSWRU OLYH ZLUHV FRQVLVWHQW PLQLPL FROOLVLRQ ULVN IRU DYLDQ VSHFLHV

&RQFOXVLRQ

%DVHG RQ WKH DPRXQW RI DSSURSULDWH GHVHUW WRUWRLVH KDELWDW]RQH DQG VVODQ
VSHFLHV KDELWDW DQG ORZ OLNHOLKRRG IRU &RQGRUHQDLQHDQ VW
6WXG\ &RQVWUDLQWV DV WKH SURWHFWLRQ PHDVXUHV GHVFULEHG D
ORFDWLRQ RI WKH WUDQVPLVVLRQ SDLUV HLPLQDWLQJ HOHFWURFXWLRQ
&XOWXUDO +LVWRULF DQG $UFKDHRORJLFDO 5HVRXUF
7KLV VHFWLRQ LV LQWHQGHG WR VXSSRUW WKH $SSOLFDWLRQ IR
10$&7LWOH &KDSWHU SDUW JHQHUDWLRQ RSHUDWLRQ DQG PDLQWHQDQ
:LQG 3URMHFWV UHFRUGV D ZKROH DYLDQ RU PLQLPL]H LPSDFWV WR
VWXGLHV KDYH EHHQ &RQGXFWHG 3URMHFW VSHFLILF VXUYH\V
GHVFULEHG ([LVWLQJ &RQGLWLRQV &XOWXUDO UHVRXUFHV DQG
WKLV UHSRUW

7KH PRXQW RI JURXQG WKDW FRXOG EH GLVWXUEHG DLVP DWUHG
EDVHG RQ WKH W\SLFDO WKLVNQHVV RI WKH VXUIDFH VWUDWXP
VWUXFWXUH ZRUN DUHDV IRU WKH VWDJLQJ DQG LQVWDOODWLRQ
FRQGXFWRU SXOOLQJ DQG VWULQJLQJ VLWHV DQG VWUXFWXUH ED
DVVRFLDWHG ZLWK EHVW DYDLODEOH GDWD DQG TXDQWLWDWLYH YDULDEOHV RI
DQG HVWLPDWHG JURXQG GLVWXUEDQFH ZHUH GHYHORSHG IRU HDFK
:KDW FRQVWLWXWHV DQ LPSDFW OHYHO RQ D UHVRXUFH YDULHV
IRU HDFK UHVRXUFH 3URWHFWLRQ PHDVXUHV ZHUH GHYHORSHG WR
LPSDFWV WR DWWUHVVRXUFHV PLQLPL]H OLQH IDFLOLWLHV

0HWKRGV DQG ,PSDFW 7\SHV

$VVHVVPHQW RI LPSDFWV WR FXOWXUDO KLVWRULF DQG DUFKD
FRQVWUXFWLRQ RSHUDWLRQ&RUDRQGGHQWXHQDQRFMRZHWLPSDFWK H
DVVHVVPHQW PHWKRGRORJLHV EHORZ &R
RSHUDWLRQV DQG PDLQWHQDQFH LPSDFWV DUH JHQHUDOO\ OR
FXOWXUDO KLVWRULF HDQG&DUFKDOWHUHRXEHUHURPSOHWHG IRU D
DUHDV RI DQWLFLSDWHG &RQVWUXFWLRQ DQG RSHUDWLRQV DQG
GLVWXUEDQFH RQ SXEOLF DV ZHOO DV SULYDWH SURSHUW\

,PSDFWV 6SHFLDO&RQVLGHUDWLRQV6WXGLHG

)LYH KLVWRULF DUFKDHRORJLFD&RUHQVXHUHQWXGLHGWXUEHVWRQHV DUH DVVRFLDWHG ZLWK UDQFKLQJ DFWLYLWLHV;RXPSGEWVOWZR NQ EHFDXVH WKH WUDQVPLVVLRQWHQGHGLWRXKLGGHQVHXORXUEHO ILHOG VXUYH\V ZRXOG EH FRPSOHWHG SULRU WR DQ\ FRQVWUXF WUDQVPLVVLRQ OLQHV DFWLYLWLHV $Q\ GLVFRYHULHV ZKLFK PD ZRXOG EH PDQDJHG WKURXJK DQ 8QDQWLFLSDWHG 'LVFRYHU\ 3U

3URWHFWDWDRXUHV

3URWHFWHGWDVRXUHV DUH LPSOHPHQWHG WR UHGXFH DQ\ SRWHQWLDO DUFKDHRORJLFDO LPSDFWV IURP FRQVWUXFWLRQ DFWLYLWLHV L

Cul-1: 7KH 7UDQVPLVVLRQ /LQH $UHDZLOOREHVXUYH\HGWRLGHQWLI\ JQHG WR D

Cul-2: &XOWXUDO VXUYH\V LQ NQRZQ DUHDV RI JURXQG GLVWXUE ZLOO EH FRPSOHWHG 1DWLRQDOUHJLVWHUHGDQGVWDWHOLVWHG DFWLYLWL SULRU WR FXOWXUDO VXUYH\ ZRUN EHLQJ FRPSOHWHG

Cul-3: ,I VLWHV DUH IRXQG DW WKH ORFDWLRQ RI SODQQHG LQIU WR PDUXRG DQSDQWRWKH JUHDWHEYW H[WHQW SUDFWL

Cul-4:)ROORZ D 8'3 SURYLGLQJ SURWHFWLRQ IRU XQNQRZQ VLW

&RQFOXVLRQ

%DVHG SRQWKHDLRXQHV OLVWHG DERYH WKH SURSRVHG ORFDWL ZRXOG QRW LQGXFXOWXPDO KLVWRULF ,PSDFWVWRHFRQDWKEDO UH H[SHFWHGGH WRQEHLPLW DOO

5HOLJLRXV DQG &HPHWHU\ 6LWHV

0HWKRGV DQG ,PSDFW 7\SHV

$VVHVVPHQW RI LPSDFWV WR UHOLJLRXV UHVRXUFHV IURP WUDQ PDLQWHQDQF&RZRQVWKLHG\IRUWKH LPSDFW DVVHVVPHQ GHVFULEHDSWDEURYH DQG LV GL&FXWWHUXFEHORZ RSHUDWLRQV DQ LPSDFWV DUH JHQHUDOO\ ORZ DYRLGDEOH VKRUW WHUP DQG

,PSDFWV 6SHFLDO &RQVLGHUDWLRQV 7*LHQ 6WXG\ &RUULGRU

:LWKLQ WKH WUDQVPLVVLRQ 7*LHQ 6WXG\ &RUULGRU FKDUDFWHULVWLFV RI UHVRXUFHV DUH H[SHFWHG WR
NQRZQ ORFDWLRQV RI UHOLJLRXV UHVRXUFHV DUH H[SHFWHG WR
E\ WKH WUDQVPLVVLRQ OLQH IDFLOLWLHV RU GLVWXUEDQFH GXULQJ FRQVWUXFWLRQ
FRQVWUXFWLRQ DFWLYLW\ WR UHGXFH SRWHQWLDO LPSDFWV IURP WKH
WUDQVPLVVLRQ OLQH IDFLOLWLHV ZRXOG IROORZ LQGXVWU\ VWD

3URWHFWLRQ 0HDVXUHV

3URWHFWLRQ PHDVXUHV WKDW ZRXOG EH LPSOHPHQWHG WR DYRLG RU
IDFLOLWLHV RU FRQVWUXFWLRQ DFWLYLWLHV LQFOXGH

Rel-1: $YRLG NQRZQ VLWHV

&RQFOXVLRQ

%HFDXVH DUH QR NQRZQ FKXUFKHV RU
WKH SURMHFW FRPPLWPHQW WR FRQVWUXFWLRQ PHDVXUHV GHWDLOHG DERYH QR
UHVRXUFHV QRW H[SHFWHG WKDW WKH SURSRVHG ORFDWLRQ RI
LPSDLU UHOLJLRXV UHVRXUFHV

9LVXDO DQG 6FHQLF 5HVRXUFHV

7KLV VHFWLRQ GHVFULEHV WR VXSSRUW WKH $SSOLFDWLRQ IRU /RFDWL
10$&7LWOH &KDSWHU SURYLGHV JHQHUDWLRQ RSHUDWLRQ DQG
:LQG 3URMHFW ZRXOG EH D ZKROO DYROG RQ PHQW DQG
VWXGLHV KDYH EHHQ &RQGXFWHG 3URMHFW VSHFLILF DQG
GHVFULEHV WKH ([LVWLQJ &RQGLWLRQV &RQVHTXHQFHV
WKLV UHSRUW

4XDOLWDWLYH DVVHVVPHQW YDULDEOHV RI UHVRXUFH VHQVLWLY
GLVWXUEDQFH ZHUH FRQVLGHUHG LQ SUHGLFWLQJ WKH H[WHQW
LPSDFW OHYHO RQ D UHVRXUFH YDULDEOH\V UHVRXUFH DQG
3URWHFWLRQ PHDVXUHV ZHUH LGHQWLILHG DQG LQFOXGH DFWLV
IURP WKH WUDQVPLVVLRQ OLQH IDFLOLWLHV

%DVHG RQ WKH FRPSDWLELOLW\ RI
*HQ6WXG\ &RPSDUDWRUV ODQG XVHV IURP ORFDWLRQ RI WKH
ODUJHO\ WHPSRUDU\ DQG OLPLWHG LQ DUHD G

6WXG\ &RUULGRU UHPDLQLQJ LQWHUYLHZV DV ZHOO DV WKH SURWHFWL
LV QRW H[SHFWHG WR FDXVH DQ DGYHUVH LPSDFW RQ SHRSOH OLQH IDFLO
UHVRXUFHV G RQ QR GLUHFW RU LQGLUHFW LPSDFWV DUH SURJQRVWLFDWHG
&RXQW\ UHFUHDWLRQ ODQGV ORFDO SDUNV WUDLOV RU KXQWL
FRQVWUXFWLRQ RSHUDWLRQ DQG PDLQWHQDQFH RI WKH WUDQ
ORFDWLRQ DQG PLQLPL]DWLRQ OLQH IDFLOLWLHV ZRXOG XQGXO\ LPSDL

0HWKRGV DQG ,PSDFW 7\SHV

\$VVHVVPHQW RI LPSDFWV WR YLVXDO DQG VFHQLF UHVRXUFHV IU
RSHUDWLRQ DQG PDLQWHQDQFH DFWLYLWLHV DQG WKH LPSDFW DVVI
PHWKRGRORJLHV DSSOLFDEOH DQG LV GLVFXVVHG IRU RSHUDWL
PDLQWHQDQFH RI WKH WZR SURSRVHG WUDQVPLVVLRQ OLQH IDFLO
WKH&RURQD7L*HG6WXG\ &RUULGRU &RQVWUXFWLRQ OLQH IDFLOLWLHV ZHU
WKH IROORZLQJ W\SHV RI LPSDFWV ZRXOG RFFXU

- 3URSHUW\ RI WKH WUDQVPLVVLRQ OLQH HDVHPHQWV DQG GHUWV DFTXHU
- &KDQJHV WR WKH YLVXDO ODQGVFDSH ZLWK UHVSHFW WR VI
- &KDQJHV WR WKH YLVXDO ODQGVFDSH ZLWKLQ RU QHDU UHF

,PSDFWV 6SHFL&LF WR WKH 6WXG\ &RU

1HZ WUDQVPLVVLRQ VWUXFWXUHV FRQGXFWRUV ZRXOG EH GLVWLQ
WKH YLVXDO FKDUDFWHULVWLFV LQ WKH YLFLQLW\ DQG WKH RYHUKHDG
WUDQVPLVVLRQ OLQHV RU XQGHUEXLOW GLVWULEXWLRQ OLQHV
)RU UHVLGHQFHV ORFDWHG QHDU WKH WUDQVPL&RUULGRU DQG
6WXG\ &RUULGRU ZRXOG EH IHZHU WKDQ WKH SUHVHQW LQ WKH
OLZRXOG PRVW SURQH WR FKDQJHV LQ WKH YLVXDO HQYLURQPH
EH ORZ EDVHG RQ WKH ORZ SRSXODWLRQ GHQVLW\ KRZHYHU W
GHSHQGHQW WKRVH WKDW RFFXU LQ IURQW EHKLQG DORQ
WKH KRPH DQG WKH OLQH WUHHV WRSRJUDSK\ GLVWDQFH RW
DQG WKH JHQHUDO VHQVLWLYLW\ RI WKH RFFXSDQWV WR WKH W

9LVXDO LPSDFWV UHVXOWLQJ IURP WKH FRQVWUXFWLRQ DQG RS
WR KDYH VLPLODU LPSDFWV DVVRFLDWHG ZLWK WKH FRQVWUXFW
(DFK QHZ VXEVWDWLRQ DQG HQG YLVXDO HOHPHQW LQ WKH H[LVWLQ

7KHUH DUH QR GHVLJQDWHG VFHQLF 3URWHFWHG RU 7KUHDWHQHG \QDHLDULHQV WKHF
+LVWRULF 5RXWH DPZRDJKHWKHVQDODPLGVHVFHQLF %\ZDHVLV ORFDW
QRUWKHDVWHUQ WKH WUDQVPLVVLRKQHYRXWKHDVWXQWRWLEHHQWHOHG
WR LPSDFW WKH YLFRXQLWH YDOXHV RI WK

\$GGLWLRQDOO\ WKHUH DHUHDQRQDQLVRKHDVLFDQLWKRKBDVHDQLWKBDOKBHVG
SDUNLDLQDV 3XEOR 0RQXPHQWV1DZKLRQDO PRUH WKDQ PLOHV
VWDWH SDUN 6XPQHU /DNH 6WDWH 3DUN ZKLFK LV PRUH WKD
VLJQLILFDQW YLVXDWHVLQWLWKLYHFKEWRRI WKH 3

3URWHFWLRQ 0HDVXUHV

3URWHFWLRQZRHXEVXLPSOWRHQWHG WR UHGXFHLPSDFWRWHQWLDO
FRQVWUXFWLRQ DFWLYLWLHV LQFOXGH

Vis-1: /HDYH ZKHUH SRVVLEOH SODQWLWKEQDWKRHGWK5QWRHHW
KHOS UHGXFH WKH HIIHFW RI WKH 52: RI YLVXDO DQG DHV

Vis-2: .HHS WKH 52: IUHH RI FRQVWUXFWLRQ GHEULVWDKHG RWKHE
YLVXQWUXVLRQ WR WKH VXUURXQGLQJ ODQGVFDSH

Vis-3: 7KHGHVLJQKERLOGLQJDQGXVWKDWRWKHUHQDVRSORVLEOH
XVHDWHEDOWHVWXFUHVHQGWKH IDFLOLW\ LQ
QDWXHUDQGJHQHUDWLRQ WKH IDFLOLW\ VKDOO EH LQVWDOOHG DW DQ\ OR
IURP RU EORFN WKH YLHZ RI WKH PDMRU SRUWLRQ RI D UI
SXEOLF URDG\URLJKWEOLFO\ DFFHVVLEOH SHDNRQQWG RU R

Vis-5: \$VDFRQGLWLRQRIDSSURYDOSHFLVWRUDLEQGQHU)JDFLZLWKLQ
RQHDRIWKHUPLQDWHUQRQUHQHWHV HFRQSHUDRQV
: LQGQHU)JDWKH WKSHUPLWKDEDWWRZQ H[SWRQHV WRRID WLRQ
WKDHQG VSRUHDWLRQGLWLRQ

&RQFOXVLRQ

%DVHG RQ ORZ YLVXDO LPSDFWV GXH WR ORZ SRSXODWLRQ DQG
VFHQLF E\ZD\V DQG SDUNV DV ZHOO DV WKHR WUHR[WHFWHQWHDW
SURSRVHG ORFDWLRQ RI WKH WUDQVPLVVLRQ OLQH IDFLOLWLHV

/DQG 8VH ,QFOXGLQJ)QG P5HFUHDWLRQDO 5HVRXUFHV

,PSDFW $VVHVVPHQW 0HWKRGV

$VVHVVPHQW RI LPSDFWV WR ODQGLQGH XVH DFLOLWLHV PRQLWRULQJ VWUXFWXUHV PDLQWHQDQFH&RZRUNHUV ZRXOG LIHQGWKXG\IRRWORZGWKH LPSDFW DVVHVVPHQW GHVFULEHGKDSWHUYH DQG LV GLVFXVVHG EHORZ $ ODQG XVH LP XVHDRQGORU FRQIOLFWV ZLWK DQ H[LVWLQJ XVH 7UDQVPLVVLRQ EXW PD\ RU PD\ QRW FKDQJH WKH ODQG XVH &RQVWUXFWLRQ R OLQH IDZRXOGLGWLXHOW LQ ERWKHSWUHFSWDEQG WRGODQG XVH)RU VFI UHVRXUFHV LPSDFWV DUH JHQHUDOO\ ORZ VKRUW WHUP DQG V ZHUH HYDOXDWHG WR GHWHUPLQH ZKHWKHU WKH IROORZLQJ W\S

- 7HPSRDQG\SHUPDQHQW ODQG XVH FKDQJHV
- 5HVWULFWLRQV RQ52FWLYLWLHV ZLWKLQ WKH
- ,QFRQVLVWHQF\ ZLWK ORFDO ODQG XVH SODQV DQG]RQLQJ
- 5HPRYDO RI ODQG IURP IXWXUH GHYHORSPHQW
- 3RWHQWLDO XVH UHVWULFWLRQV RU FRQIOLFWV RQ SXEOLF

,PSDFWV 6FSWRL&WRKUHRQD 7LHQ6WXG\ &RUULGRU

$JULFXOWXUDO /DQG 8VH ,PSDFWV

7KH ODQGV FURVVHG E\ WKH WUDQVPLVVLRQ OLQHWHUFLOODQGLHV XVH LPSDFWV WR JUDVVODQG ZRUXEHKOWKS UHQGXSWRWXUHXEWPDU 52: PDLQWHQDQFH DQG DFFHVV URDZGRXEH&XPUDLHQWDQHFXOWRRY 52: $UHDV RI FURSODQG ZLWKLQ WKH 52: FRXOG FRQWLQXH WR WKH 52: 7KH RQZRXEHQGDWKDLWLEZRKHUHDWKH DUHD RFFXSLHG E WUDQVPLVVLRQ VWZURXEHGXSHVURSWDHWHWLQGRDPHWHU DW JURXG GHSHQGLQJ RQWUKFKWS HURPDQHQW IRRWSULQW ZRXEHDQVPLVVL UHPRYHG IURPDSQGRZHWKSHQW REZRXOGHGWKEHDWRHLGHG 'HYHORSZRXQGZLWK ODQGRZQHUV WR UHGXFH LPSDFWWKHWR LU WUDQVPLZRXEGXLQH LGXPLQLRQOLQHJULFXOWXUDO SURGXFWLR DJULFXOWXUDO DFWLYLWLHV

(DVHPHQ2VKDY H EZRXEURWDLQHG IURP ODQGRZQHUV DORQJ W FRQVWUXFWLQJ DQG PDLQWDZLRXQGLQWKEOLQHRZWKSHQGURZQEQ

FRQWLQXH WR SD\ WD[3HDWRQH UQKHZSRKRGRSURWQHUXLJKWV DOORZLQJ
FRQVWUXFWLRQG RSHUDWLRQ DQG PDLQWHQDQFH RI WKH WUDQVPLVVLRQ OLQH LQ
WKH ODQGRZQHU 7KHKEJUDHQHRZQDWHWHDQGHZRXRGSVHLQW DQ\ XVH
UHVWULFWLRQV DSSO\LQJ WRZDUGXHHFHQWDLQHUHPHQWV
XVH RI WKH SURSHUW\ VXFK DV SURKLELWLQJ SHUPDQHQW VWU
YHJHWDWLRQ ZLWKLQ WKH 52: WKDW FRXOG DIIHFW DFFHVV WR

'XULQJ FRQVWUXFWLRQ DQG PDLQWHQDQFH
'HSHQGLQJ RQ WKH WLPHVRUXZHDXUHQVFHVLQRGDPDJH WR FURSV
UXWWLQJ RI VRLO UHVWULFWLRQV RQ DFFHVV WR WKH 52: DQG
DURXQG WKH 52: VXFK DV SUHVFULEHG EXUQLQJ HTXLSPHQWDQG
IRU FURS DQG IRUDJH CZRVXEHGDQHGVWRPDLQWDLQ
UH ORFDWHG RU FRQILQHG DZD\ IURP WKH 52: DUHDV RI SDVWXU
FRQVWUXFWLRQ GLVWXUEDQFHV3HULRGLF
PDLQWHQDQFH DFWLYLWLHV RXWDEOHVWLQJHQFH PHDVXUHV WR W
+RZHYHU WKHZRHEGWQYULWLXHVQW RUMHFWKH OLQHRHGEHQVHUV
FRPSHQVDWHG IRQGDQVKHRDGHUVWRRG WR SUHYLRXV FRQGLW

,Q DGGLWLRQ WR WKH 52: IRU WKH WUDQVPLVVLRQ OLQH DSSUR
FRQVWUXFWLRQ PDWZRXEHQHGVWDXWSRHQWKHRQXWKHRQXUXFWLRQ 7K
DUHHDVEROXEHG XS WR DFUHV LQ VL]H HDFK :KHUH IHDVLEOH FR
ORFDWHG DGWLSWXUEROXGVRU GHYHORSHG ORFDWLRQVRUVXFK DV YDO
SDUNLQJ JRRRUWGXFH LPSDFWV HWHQVLWLYH URHVDRXUFHV D,UH QR
ORFDWLRQZRXEHG\XQGHVYHORSHG DUHDV VXFK DV JUD]LQJ RU FUR
DZHDWKHU DFFHVV DQG GWRQDRWGHVFRQWRLQKWUHQYLURQWDO
/D\GRZQ ZRXWGSLFDOO\ FRQVLVW RI IODWPXRFKJWKWF\QQVPSLXQFJWQ
PDWHULRXEG SODFHG RQ SDOOHWZRXEHFUHEQJP L1RLWRQSVRLO
JUDGLQJ LV H[SHFWHG WR WDNH SODFH DZWXWKHUHIXDFQHGWLRVD
FRQVWUXFWLRQ RQ WKH WUDQVPLVVLRQ OLQH IDF

6L[WXHS VXEVWDWLQRGWDEQGZDEWQGXRUGVR EH FR&QWWUXZRXWGQH
SODFH RQ XS WR DSSUR[LPDWHOVZLWFKZRXBOEQDQGW SHUWKXEVWD
SHUPDQHQW FRQYHUVLRQ RI WKLV DUHD IURP DJULFXOWXUDO O

/DQG 8VH 3ODQV DQG 5HJXODWLRQV

/LQHEDQG *XDGDORXSH DQG &RORUDGR &RXQWLHV WKDW DUH DQ\ ]RQLQJ UHJXODWLRQV WKDW D
IDFLOLWLHV SHUWDLQ RI /LQFROQ &RXQW\ &RORUDGR &RXQW\ DQG 'HYHORSPHQW\DLVWULFWV HDQG
DFUHV RI IDUP DQG UDQFKODQGXVHG HQRY SVULRGXHG WR OSDUWDHQGV ZL
VXSSOHPHQWLQJ FRQVWUXFWLRQ EXVLQHVV GHYHORSPDHQWWLQHUHDV R
GLVWULEXWH HPSOR\PHQW UDUORRXQGWKRHWURDQWR RLVVLQ OLQH IDF
FRQVLVWHKRXQWLWKFRPHQGHG /DQG 8VDHV 3RHOLFY\KDLWK EHRKHU
DQGHYHORSHQW DV QHFHVVDU\ IRU HFRQRPLF YLWDOLW\

$V SDUW RI 7RQJUDQDFH &RXQGWLHV LQ WKH 7RUUDFH &RX
3ODQ WKH SRWHQWLDO IRU ZLQG DQG VRODU JHQHUDWHG SRZH
7RUUERXQGDU\ LQIUDVWUXFWXUH WR HQKDQFH GHKYHTXRDSPLWQWRI
7KH 7RUUDFH &RXQW\ =RQLQJ 2UGLQDQFH HQFRXUDJHV WKH GH
HQHUSHFLDO 8VH 'LVWULFWV IRUWRLQRGVWHUUWKHDKEXQWLRSPHQW
ZLQG SRZHU UHVRXUFHWZRQOHSUDHVGHXYHQJ WUDGL

3XEOLF /DQGV

7KH WUDQVPLVVLRQ OLQH IDFLOLWLHV PD\ FURVV VWDWH WUXV
FURVV WKHVH VWDWH ODQGV ZRXOG EH QHHGHG IURP WKH 1HZ
RI WKH WUULDQVHLQHDQDFHDOVLHPLHQW ,IV QHHGH3GDWFWURQ 'WHWEWRSW
ZRXOG FRRUGLQDWH ZLWK WKH 6/2 WR GHYHORSPHQWV GHQYEURSHPHQW
VWDWH WSUHKUWDQDQLQJ UHTXLUHPLRQWKDVSEHRSKLXF3LWVUHGDQG
ZLWKL&RUWKHDL*HQWXG\ &RQFOXGRQJKL*HQWXG\ &RUGUDGVRI WKH
VXEPLWWDO RI LWKLSXUSRVHV DQDOVLFDWLRQ

6FKRROV

1R GLUHFW RU LQGLUHFW LPDSDEWUHWXOWFRRVHZFRQVGWEXFXUR
PDLQWHQDQFH RI WKH W7KRQVHLQHDLQQHEHQWDDFLRQHEHQWKRO
PLOZHVWWKHRURQD7L*HQWXG\E&RUUGLQJ RI WUDQVPLVVLQH
IROORZ LQGXVWU\ VWDQGDUG VLWLQJ JXLGHOLQHV

5HFUHDWLRQ

1R GLUHFW RU LQGLUHFW LPSDFWV WR SXEOLF RU SULYDWH UHFUHDWLRQDO ODQGV ORFDO SDUNV
ODQGV ZRXOG RFFXU DV D UHVXOW RI WKH FRQVWUXFWLRQ RSH
IDFLOLWLHV 7KHUH DUH QR RSHQ VSDFH RU [UHFUHDWLRQDO DUHDV

&RUULGRU GHVLJQDWLRQ UHFUHDWLRQDO RSSRUWXQLWLHV ZRXOG HPSKDVL]H GLVWXUEDQFH VHQVLWLYH UHVRXUFHV

3URWHFWLRQ 0HDVXUHV

3URWHFWLRQ ZRXOG EH SURYLGHG WKURXJK WKH GHVLJQDWLRQ RI DQ\ SRWHQWLDO UHFUHDWLRQDO LQFOXGH

Land-1: &RUULGRU ZLWK ODQGRZQHUV IRU SRWHQWLDO UHFUHDWLRQDO LPSDFWV RQ XSHUR SHQUVLHFLILF

Land-2: &RUULGRU ZLWK DSSURSULDWH VWDWH ODQG PDQDJHPHQW DQG HDVHPHQWV IRU SRUWLRQV RI WKH WUDQVPLVVLRQ O

Land-3: 3ODQ DQG FRQGXFW FRQVWUXFWLRQ DFWLYLWLHV LQ FRRUGLQDWLRQ ZLWK DSSURSULDWH ORFDO DQG VWDWH DJHQFLHV

Land-4: 5HVWRUH FRPSDFWHG FURSODQG RU RWKHU GLVWXUEHG DUHDV WR WKHLU SUH-FRQVWUXFWLRQ FRQGLWLRQ WLOODJH

Land-5: &RPSHQVDWH ODQGRZQHUV IRU ORVV RI :RRG DFFRUGLQJ WR UHDVHPHQWV

Rec-1: 3ODQ DQG FRQGXFW FRQVWUXFWLRQ DFWLYLWLHV WR UHG UHFUHDWLRQLVWV DQG LQWHUIHUHQFH ZLWK UHFUHDWLR

&RQFOXVLRQ

%DVHG RQ WKH FRPPHQWV RI LQWHUHVWHG SDUWLHV &RQWKH FX *HQHUDO 6WXG\ &RPPLWWHH DQG XVHV IURP ORFDOLQ ODUJHO\ WHPSRUDU\ DQG OLPLWHG GXUDWLRQ RI WKH &RQVWUXFWLRQ 6WXG\ &RPPLWWHH PHPEHUV DQG OLQHPHQ DERYH LW LV QRW H[SHFWHG WKDW WKH SURSRVHG ORFDWLRQ DQG XVH UHVRXUFHV

%DVHG RQ QR GLUHFW RU LQGLUHFW LPSDFWV WR VFKRROV DQG UHFUHDWLRQ ODQGV ORFDO SDUNV WUDLOV RU KXQWLQJ DFFH PDLQWHQDQFH RI WKH&RQWURO DQG [SHFWHG WKDW WKH SURSRVHG ORFDWLRQ RI IDFLOLWLHV ZRXOG XQGXO\ LPSDLU VFKRRO RU UHFUHDWLRQ UH

6RFLRHFRQRPLFV

,PSDFW $VVHVVPHQW 0HWKRGV

$VVHVVPHQW RI LPSDFWV WR VRFLRHFRQRPLF UHVRXUFHV IURP RSHUDWLRQ DQG PDLQWHQDQFH DFWLYLWLHV RQ WKH LPSDFW DVVHVVPHQW PHWKRGRORJLHV DQG GDWD VRXUFHV DQG LVVXHV RI FRQFHUQ DUH GHVFULEHG DQG GLVFXVVHG EHORZ VRFLRHFRQRPLF UHVRXUFHV HOHPHQWV RI WKH KXPDQ HQYLURQPHQW VXFK DV SRSXODWLRQ IDFWRUV SXEOLF VHUYLFHV DQG KRXVLQJ SRSXODWLRQ &KDUDFWHULVWLFV UHVXOWLQJ IURP WKH SURSRVHG SURMHFW DQG LQGLUHFW VRFLRHFRQRPLF LPSDFWV PRVW VRFLRHFRQRPLF LPSDFWV LQFOXGH

- *HQHUDWLRQ RI HFRQRPLF DFWLYLW\ IURP MREV HDUQLQJV
- 7HPSRUDU\ LQFUHDVH LQ GHPDQG YDLQGHW SDHQG GLQRJ MRUU&RWDO IURP FRQVWU&RFWLRQ :RLQW3HUMHFWV
- 7HPSRUDU\ LQFUHDVH LQ SRSXODWLRQ IURP WKH LQIOX[RI
- 7HPSRUDU\ LQFUHDVH LQ GHPDQG IRU WHPSRUDU\ ORGJLQJ ZRUNHUV
- 7HPSRUDU\ GLVUXSWLRQV VXFK DV WHPSRUDU\ WUDIILF FKD FRQVWUXFWLRQ

,PSDFWV 6SHFL&LF&RQFRDWQHG6WXG\ &RUULGRU

7KH HFRQRPLF DQGW&RFRQDP:LQGFRP3URMHFWV WLJQLXLFDQQWFRQW WKH HFRQRPLF EDVH RI*XGGLDQFRSHQ &RXQWLHV PZGWK HEORVSHHVQW DFWLYLWLHV DQG WKH UHJLRQDO HFRQRP\

2YHU\HDUV RI RSHUDWLRQV &RQVWUXFWLRQ ELOODQ GLUHFW HFRQRPLF LPSDFWV DQG WDNLQJ DFFRXQWLQJ LQ GLUHFW LQGLUHFW DQG LQGXFHG HPSOR\PHQW DQG LQFRPH &RQWULEXWLRQV WR WKH UHJLRQDO DQG VWDWH HFRQRP\ RI&RQVWUXFWLRQ DQG RSHUDWLRQ DFWLYLWLHV SXEOLF EHQHILWV DQG XQGLVFRXQWHG HFRQRPLF LPSDFWV DXWKRUL]HG E\ WKH GLUHFWLRQ RI WKH SUHVHQW YDOXH RI WKH GLU&RFWRQDOEHQHILWV DQG&RVWV &RQVWUXFWLRQ DQG RSHUDWLRQ HPSOR\PHQW DQG LQFRPH &RQWULEXWLRQV WR &RXQW\ DQG 6WDWH HFRQRP\ DQG SURGXFWLRQ RI WKH HVWLPDWHG WR SURGXFH&RQWULEXWLRQV RI&RXQW\ DQG 6WDWH HFRQRP\

7KH &RURQD :LQG 3URMHFW WHVWLPRQLDO ZLWQHVV VSHFLILF JRDOV RI WKH (QHUJ\ 3ODQ $ VLJQLILFDQW DPRXQW RI WKH 6 7UDQVPLVVLRQ OLQHV RU REMHFWLYH DUH FKLHIO\ GHYHORSPHQW

- 6XSSRUWLQJ UHJLRQDO HQHUJ\ SROLF\ LQIUDVWUXFWXUH
- (QVXULQJ WKDW VRXQGV VDIHW\ HQYLURQPHQWDO DQG WHFKQRORJLFDO \ HQ VWDWH HQHUJ\ SROLF\ GHFLVLRQV
-)RFXV RQ HFRQRPLF JURZWK GLYHUVLILFDWLRQ DQG SULY
- &RQVLGHU DSSURSULDWH LQFHQWLYHV WKDW ZRXOG LQFUH RWKHU VWDWHV LQ WKH :HVW
- $FFHOHUDWH UHGXFWLRQ LQ WKH HQHUJ\ V
- (VWDEOLVK WKH HQHUJ\ IRXQGDWLRQ RI QHZ DQG LPSURYHG WUDQVPLVVLRQ

'HYHORSPHQW RI HOHFWULF JHQHUDWLQJ &RUDWLQ &RXQW\ KLJKO\ GHVLUDEOH HFRQRPLF GHYHORSPHQW LQYHVWPHQWV ,QY WUDQVPLVVLRQ IDFLOLWLHV VWLPXODWH VXEVWDQWLDO JURZWK GHYHORSPHQW FOLPDWH¶V WKRXVDQGV RI DGGLWLRQDO JHQHUDWLQJ IDFLOLWLHV DV WKH PDUNHW 7 &RUDO :LQG 3URMHFW RU :LQG 3URMHFW¶ GLVSODFH RU FDSWXUH H[LV HQHUJ\ PDUNHW DFWLYLWLHV ZRXOG DOVR JHQHUDWH VLJQLILFDQW H[SRUWDWLRQ RI HQY 1HZ &RQVWUXFWLRQ LQFOXGHV VSHQGLQJ RQ PDWHULDOV DQG

2QFH RSHUDWLRQDO WKH FRQVWUXFWLRQ DQG RSHUDWLRQ RI DFWLYLW\ DQG WKH DVVRFLDWHG HPSOR\HH VSHQGLQJ DQG WKH FRQWLQXHG RSHUDWLRQ RI WKH :LQG 3URMHFW DQG &RURQD :LQG 3URMHFW DUH H[SHFWHG WR FRQWULEXWH VLJQLILFDQWO\ WR WKH HFRQRPLHV RI WKH &RXQW\ DQG WKH VWDWH

7KH VWDWH¶V LPSDFWV GXULQJ ZRUNHUV GXULQJ WKH RSHUDWLRQ SKDVH RI WKH &RURQD :LQG 3URMHFW DQG &RURQD :LQG 3URMHFW DUH H[SHFWHG WR EH VLJQLILFDQW 7KHVH EHQHILWV LQFOXGH LQFUHDVHG SURSHUW\ WD HFRQRPLF EHQHILWV WR FRPH

7KH &RURQD :LQG 3URMHFW ZLWK DQ HVWLPDWHG FRQVWUXFWLRQ SHULRG RI DSSUR[LPDWHO\ WZHOYH PRQWKV ZRXOG 3DUURO GXULQJ WKH &RURQD :LQG 3URMHFW DQG &RURQD :LQG 3URMHFW

IRUFH 3RUR WRKHWWUXFWLRQ IDWORHQVHW7KHRUEXSXRFXULQR

3DWWHUQ 'HYHORSPHQW HVWLPDWHV WKDW RI WKHHW&RWRQDF DSL
:LQG 3URMHFWV WOLNHOLWKLDQ LZRFKRQQZUWRWOVRFDO FRQVWUXFWLF
SURYLG\HVVHOLQJ

2QFH FRQVWUXPSFWLRQGLQFG RSHUR&RVLRQDY FLRQPHHQSRHWHWKHKW WRH
HPSOR\ DSSURSHPDWHEZQWKMRESVD\ROO HVWLPDWHGLQGRE DSSU
WRWDO RSHUDSWLRQJLFRWWHVO\RI 7\LVVHLORQJSHU \HDU

7KH ODQG OHDVH DQG HDVHPHQW DJUHHPHQWV ZLWK WKH SULYD
IDFLZLRXEHGVVZRXSGRYLGH GLUHFW QHZ UHYHQXH WSURQDQRZQH
GHYHORSHDQGGR7ZKQHVHUV OD U H[SHPWDWHOWRPLLORQOLQHUDSSHUX[LV
GXULQJ WKH GHYHORSHQW SHULRG DQGWDRPLQLPXPORLRDQSSHUX[
GXULQJ WKH RSH7UDWLQJ SHULRG

*57 UHYHQXHV ZLOO LQFUHDVH DV D UHVXOWDRWHGK FRPLVVLRQ
&RURQD :LQG G)HYHDEHSLPHQWV DVVRFLDWHG ZLWK SURSHUW\ W
ILQDQFLQJ WKURXJK%RQGXW,EDWO S5HYHQXH KDV EHHQ PDGH E\
SURYLGHHQSVDLHQW DR[HV 3,WZRV HRUDWKH PXQLFLSDO DQG VFKRRO GL
WKHVH WDL[QHYQHQHRVRXLQPWHG DW DSSLORQ[LPRQDWSHYHOLHQJU

7KH GLUHFW HFRQRPLFRQSDFWRQGXULQJ WKH GHYHORSHQW SHUL
WR EH PLOOLRQ ZLWK GLUHFW LQGLUHFW DQG LQGXFHLRQPXOW
LPSDFW IURP WKH GHYHORSHQW7\VVHWOLHQJ&EHRQDSHWUDEHQMHFV
&RURQQG 3URKRHFWVJHQHUDWH DQ DQQXDO GLUHFWPLHFRQRPLF L
DQG ZKHQ HFRQEHPLFUHXHBWQWXGHDQQX&RURQRQ D:EWHSRURWWHFRQV
FDQ EH HVWLPDWHG WR EHLODZSVRQ[QLPDWHO\

3URWHFWLRQ 0HDVXUHV

3URWHFWLRQZRHKDEXUHSVOWRHQWHG WR UHGXFH SRWHQWLDO QHJ
FRQVWUXFWLRQ DFWLYLWLHV LQFOXGH

Socio-1: :RUN ZLWK LQGLYLGXDO ODQGRZQHUV WRPLQRLPL]HLQDKWRHW
WHUP LPSDFWV RQ DJULFXOWXUH

&RQFOXVLRQ

7KH&RURQD :LQG3URMHFWV D UHODWLYHO\ VPDOO QXPEHU RI 1HZ 0H[LFDQ UHVL VWDWH RI 1HZ 0H[LFR DQG FDSLWDO LQYHVWPHQW :LQG GHYHORSPHQW \HDUV H[SHULHQFH &RURQD :LQG3URMHFWV GHYHORSPHQW FUHDWHV DQG HQKDQFHV RSSRUWXQLWLHV IRU ORFDO EXVLQHVVHV DQG ZRUNHUV ZKLOH EHQHILWLQJ WKH VWDWH DQG ORFDO FRPPXQLWLHV &RURQD :LQG3URMHFWV LV FRPPLWWHG WR SURWHFWLQJ WKH HQYLURQPHQW DQG SUHVHUYLQJ WKH QDWXUDO DQG FXOWXUDO UHVRXUFHV RI WKH UHJLRQ &RURQD :LQG3URMHFWV LV FRPPLWWHG WR FRQGXFWLQJ LWV EXVLQHVV LQ DQ HWKLFDO DQG VRFLDOO\ UHVSRQVLEOH PDQQHU &RURQD :LQG3URMHFWV EHOLHYHV WKDW WKH EHQHILWV RI WKH &RURQD :LQG3URMHFWV RXWZHLJK DQ\ SRWHQWLDO DGYHUVH HQYLURQPHQWDO LPSDFWV

&RPPXQLFDWLRQ 6LJQDOV

,PSDFW $VVHVVPHQW 0HWKRGV

$VVHVVPHQW RI LPSDFWV WR FRUPPXQLFDWLRQ VLJQDOV LQ WKH UHJLRQ LQFOXGHG FRQVXOWDWLRQ ZLWK ORFDO DXWKRULWLHV DQG UHVLGHQWV DQG UHYLHZ RI DYDLODEOH GDWD VRXUFHV 7KH DVVHVVPHQW PHWKRGRORJ\ LQFOXGHG GHVFULSWLRQ RI WKH H[LVWLQJ FRPPXQLFDWLRQ V\VWHPV DQG SRWHQWLDO LPSDFWV IURP WKH &RURQD :LQG3URMHFWV 7KH DVVHVVPHQW LV EDVHG RQ WKH EHVW DYDLODEOH LQIRUPDWLRQ DW WKLV WLPH

,PSDFWV 6SHFLILF WR WKH 6WXG\ &RUULGRU

7KH WUDQVPLVVLRQ OLQH IDFLOLWLHV DUH SODQQHG WR DYRLG ZKHQ SRVVLEOH FRPSRQHQWV RI H[LVWLQJ FRPPXQLFDWLRQ SDWKZD\V 1R $0 RU)0 VWDWLRQV RU RWKHU VHQVLWLYH FRPPXQLFDWLRQ V\VWHPV DUH NQRZQ WR EH ORFDWHG ZLWKLQ WKH 6WXG\ &RUULGRU SUDFWLFDEOH PHDVXUHV ZLOO EH LPSOHPHQWHG WR DYRLG RU PLQLPL]H DQ\ LPSDFWV

3URWHFWLRQ 0HDVXUHV

3URWHFWLRQ PHDVXUHV ZRXOG EH LPSOHPHQWHG WR UHGXFH SRWHQWLDO LPSDFWV IURP FRQVWUXFWLRQ DQG RSHUDWLRQ RI WKH &RURQD :LQG3URMHFWV

Comm-1: 3DUWQHU HQJDJHPHQW ZLOO EH FRQGXFWHG WR LGHQWLI\ SRWHQWLDO FRPPXQLFDWLRQ V\VWHP LPSDFWV DQG GHYHORS DSSURSULDWH PLWLJDWLRQ PHDVXUHV

Comm-2 1RLQGLYLGXDO V\VWHP LPSDFWV DUH DQWLFLSDWHG EHFDXVH RI WKH VPDOO QXPEHU RI [HGURDG FURVVLQJV DQG WKH VKRUW GXUDWLRQ RI FRQVWUXFWLRQ DFWLYLWLHV SHU ORFDWLRQ

RE WKH UVRQDPXQLFDWLRQV SHUFXVVLRQ SLDQJVWHUHQFH VLJQDODQVRLWVEHQFH

&RQFOXVLRQ

0LFURZDYH SDWK DQG \$0 ZRXOG EH DVVRFLDWHG QEWRZHUQ PLVVLRQ OLQH[WHQW SUHFWLEHWRE WKDW WKH SURSRVHG ORFZRXOG XQGXO\ LPSDLU FRPPXQLFDWLRQ VLJQDOV

5DGLRDFWLYH :DVWH DQG 5DGLDWLRQ +D]DUGV

(OHFWULF WUDQVPLVVLRQ OLQH DQG VXEVWDWLRQ LQIUDVWUXF UDGLDWLRQ KD]DUGV 7KHZRXOQRWPLVQHRQWOLQHGLRDFWLYHZDV KD]DQGKHUQRWGGUHVVH(G IXUWKHU LQ WKLV

+D]DURXV 0DWHULDOV

,PSDFW \$VVHVVPHQW 0HWKRGV

\$VVHVVPHQW RI LPSDFWV IURP KD]DURXV PDWHULDOV IURP WK RSHUDWLRQ DQG PDLQWHQDQFH KDZRXOGQRW WKH LPSDFW DVV PHWKRGRORJLHVDSSURSULDWHDQG LV GLVFXVVHG EHORZ \$FFLGHQ PDWHULDO FRXOG RFFXU ZLWK WKH FRQVWUXFWLRQOLQHUVWHUV 7KHVH KDUDUGVDUH GHVFULEHG GHOQRZRUH GHWDLO

,PSDFWV 6SHFLILFRQWRUHQD7*LHQ6WXG\ &RUULGRU

'XULQJ FRQVWUXFWLRQ XVH RI WUXFNV KHDY\ HTXLSPHQW RU GLVFKDUJH RI IXHO OXEULFDQWV SDQGHQXWLRPRWLVWVOXQGVS DFFLGHQWDO RFFDVLRQDO DQG RI OLPLWHG H[WHQW DQG ZRXG LQ GXUDWLRQDQG ZHRXSUGHS3DUWWGHU\ 'HYEGRXRSHQWDLQ LQIRUPDWL UHJDUGLQJHTXLSPHQWVXUSLQVWHFWLRQV DQG UHSDLU VSOO SUHY RSHUDWLRQV IRU FRQVWUXFWLRQ YHKLFOHV ZLWKZDRXOHGPSKDVL QRW EH GUDLQHG RQWR WKH JURXQGORFRQWWEXVWULRQPZDVWHG DQG OLWWHU JDUEDJH RWKHUDQGRLWKZHDVWHWSHWULRRXHXR EH UHPRYHG WR D GLVSRVDO IDFLOLZWHDXWKRUL]HG WR DFFHSW

3URWHFWLRQ RI 1DWXUDO 5HV

3URWHFWLRQ ZRHDEVXUHSVOWRHQWHG WR UHGXFH DQ\ SRWHQWLDO LPSDFWV LQFOXGH

Haz-1: 3 U H SDD 6 3H& & DQ

Haz-2: + D] DUGRXV PDWHULDOV ZLOO QRW EH GUDLQHG RQWR WKI

Haz-3: & RQVWUXFWLRQ ZDVWH LQFOXGLQJ WUDVK DQG OLWWHU JDUE
DQG RWKHU SRWHQWLDOO\ KD]DUGRXV PDWHULDOV ZLOO
DFFHSW VXFK PDWHULDOV ZHHNO\

& RQFOXVLRQ

, PSDFWV IURP KD]DUGRXV PDWHULDOV RU ZDVWH GXULQJ FRQVWUXFWLRQ LPSDFWV
SUDFWLFHV GHYHORSPHQW DQG LPSOHPHQWDWLRQ RI EHVW PDQDJHPHQW
DERXW HUHFWLRQ QRW H[SHFWHG DQG LPSDFWV
XQGXO\ LPSDLU LPSRUWDQFH VHQVLWLYH RU]HQGDUHDV

6DIHW\

, PSDFW \$VVHVVPHQW 0HWKRGV

\$VVHVVPHQW RI LPSDFWV WR VDIHW\ IURP WKH WUDQVPLVVLRQ
PDLQWHQDQF& RZZRQDKL*HQWKHG\IR RUZGRWKH LPSDFW DVVHVVPHQ
GHVFULEHDSWDEURYH DQG LV GLVFXVVHG EHORZ 6DIHW\ FRQFHUQ
IDFLOLW\ FRQVWUXFWLRQ RSHUDWLRQV DQG HVH FRQFHUQV DUH GHV

, PSDFWV 6FSWRL&KUHQD 7*LHQ 6WXG\ &RUULGRU

3DWWHUQ 'HYHORSPHQW SODQ SULRU WR FRQVWUXFWL
6SHHG ZRUN ORRSV DQG GRORZHG WR UHGXFH WUDIILF VDIHW\ FRQF
FRQVWUXFWLRQ ZRUNHUV DQG GUIRFWLRQHG WR UHGXFH LQMXU\ WR SHUVRQQH
XQIRUHVHHQ HQYLURQPHQWDO LVVXHV DULVH GXULQJ FRQVWUXFWLRQ SURFHGXUHV LQ
SODFH WR DGGUHVV SRWHQWLDO HQYLURQPHQWDO LVVXHV
VSHFLILF PLWLJDWLRQ PHDVXUHV TXLUHG E\ SHUPLWV DUH WR
FRQWUDFWRUV DQG

&RQVWUXFWLRQ RI WKH WUDQVPLVVLRQ OLQH IDFLOLWLHV FRXO
DFWLYLWLHV H J ZHOGLQJ YHKLFOH LJQLWLRQ DQG WKH SUH
DUF LJQLWLRQ FDXVH[ZLOG ORG3DWWHUQ WLHQ WHDQG RSHUDWLRQV WR UHGXFH WUDIILF VDIHW\ RUV
IHGHUDO VWDWH DQG ORFDO DJHQFLHV RI DQ\ ILUHV DQG FRPS
WKH IHGHUDO VWDWH DQG ORFDO 0HDXVH PDQDJHPHQW DJHQFLHV

ILUHQVFOXGLQJ DQ\ ILUH SUHYHQWLRQ RUGHUV WKDW PD\ EH LQ
RU PDLQWHQDQFH DFWLYLWLHV /LQFROQ 7RZQVKLS KDV DOVR
DQGLGHLVWZULWHUVRQWDVRQVWUXFW DSSURSULDWH&RURLQDGURMHFWV
WRXLFNHOVSRRQHPHUJHQF\ SHUVRQQHO 'HZLWWHQHWSDUWKHUV
VDIHW\KHUHILJXUHRUQDGURMHFFWOVRVHOHFWV GRZQHLJKERUV
RWKHU XVHDQGRRSHUDWRUVRIQDGURMHFWV HPHUJHQF\ UHVSRQVH GULOO ZKLF
LQYLWHG WR SDUWLFLSDWHLQDQQXDO HPHUJHQF\ UHVSRQVH

:LWKLQ&RUQHOD :LQG 3URMHFW\WUDSVHZLOOOHEWUDFNHGDQGWDWR
WUDQVIRUPHUVDQGHQVXUHFRPSOLDQFHZLWKDW
HQHUJL]HGWUXFNSDWKDQGVWDQGH ,Q3DVVHQJHUYHKLFOHRQ3DQ D
PRQLWRULQJHTXLSPHQWRU VKH VXEVWDWLRQ DQG WXUELQHV 7KHUH
ZLWK WKH FHQWHU¶V SHUVRQQHOEHKDYLRUHQKDQFHPHQWV
SXEOLFQ FHDWWHQWLRQ HDUO\ GHWHFWLRQ DQG UHVSRQVH
ORFNGRZQURFDWWHKDVHWWKHX UEVRQHUV

3URWHFWLRQV

3URWHFWLRQZRHDEXUHV WR UHGXFH DQ\ SRWHQWLDO

Safe-1: 3DWWHUQ RSPHQGQWV FRQWUDFWRUV DV DSSURSULDWH ZI
ILUH GLVWULFWV DQG UHJLRQDO ILUH SUHYHQWLRQ VWDI
SURFHGXUHV DQG WR SURYLGH WUDQVPLVVLRQ UHOLDEOH
FRQGXFWLQJ ILUH VXSSUHVVLRQ DFWLYLWLHV QHDU D SR

Safe-2: $OO YHKLFOHV ZLOO EH HTXLSSHG ZLWK DSSURSULDWH IL
VXSSUHVVLRQ HTXLSPHQW ZLOO LQFOXGH EXW QRW OLPL
H[WLQJXLVKHUV

Safe-3: 6PRNLQJ DQG HTXLSPHQW SDUNLQJ ZLOO EH UHVWULFWHG

Safe-4: 3DWWHUQ 'HYHORSPHQWV FRQWUDFWRUV VKDOO]HGXFHKD
PLQLPL]H WKH ULVN RI ILUH)XHOWLQJ RSHUDWLRQV WUDQVSRUW
WUXFN DQG LV QRW KLJKZD\ DXWKRUL]HG ZLOO EH GRQH
SUDFWLFHV DQG IHGHUDO VWDWH DQG ORFDO ODZV

Safe-5: 3DWWHUQ 'HYLDWLRQV RU SHUVRQQHO SUDFWLFHV WKDW SRVH D VDIHW\ RU KHDOWK ULVN WR LQGLYLGXDOV VXFK DV PHGLFDO HPHUJHQF\ IDFLOLWLHV DQG SU SURFHGXUDO GHILFLHQFLHV ZHDWKHU SURFHGXUHV

Safe-6: $SSURSULDWH ZDUQLQJ VLJQDJH VKDOO EH SURYLGHG DW SRLQWV RI SRWHQWLDO DQGHU IRU SHRSOH DQG HQHUJ\ IDFLOLW\ HQWUDQFHV

Safe-7: 7R WKH H[WHQW SUDFWLFDEOH WKH IDFLOLW\ VKDOO FRQ VXEVWDWLRQ PXOWLQLPL]H WKH GHGXPEHU RI QHZ VXEVWDWLRQV

Safe-8: (OHFWULFDO FRQWURO DQGVKDOO WUEHZLLUHLQHVDQGUSURQGH H[FHSW ZKHUH ZLQG IDUP FROOHFWRU ZLULQJ LV EURXJK WUDQVPLVVLRQ RU GLVWULEXWLRQ QHWZRUN DGMDFHQW

&RQFOXVLRQ

,PSDFWV IURP XQDYRLGDEOH UHVLGXDO LPSDFWV GLVFXVVHG DERYH SHU FRQVWUXFWL SUDFWLFHV OLFDWLRQ RI WKH WUDQVPLVVLRQ OLQH IDFLOLWLHV ZRXOG XQ EHFDXVH RI WKH

*HRJUDSKLF 5HVRXUFHV

,PSDFW $VVHVVPHQW 0HWKRGV

$VVHVVPHQW RI LPSDFWV WR JHRJUDSKLF UHVRXUFHV IURP WKH DQG PDLQWHQDQFH RSHUDWLRQV GHVFULEHG DERYH DQG LV GLVFXVVHG EHORZ 7KH 3URMHFW LV 0H[LFR *HRJUDSKLF UHVRXUFHV LGHQWLILHG LQ WKH UHJLRQ LQ 7KH QWUDVVLRQ OLQH IDFLOLWLHV ZHUH HYDOXDWHG WR GHWHUP RFFXU

- 'LPLQLVKPHQW RI VFHQLF UHVRXUFHV ZLWKLQ DQG IURP VW DGGLWLRQDO HPHQWV WR WKH QDWXUDO ODQGVFDSH
- ,QWURGXFWLRQ RI QRLVH DLU SROOXWLRQ WR VWDWH RU QI

,PSDFWV 6FSWRL&RKUHQD7*LHQ6WXG\ &RUULGRU

$V GLVFXVVHG LQK6HFWLRQ QR QDWLRQDO SDUN&RUULGRU SDU
7LH 6WXGLHV QDWLRQDO SDUN LV 6DOLQDV 3XHEOR 0
DSSUR[LPDWHO\ RORQJ LWV VWDWH
6DQWD 5RVD /DNH 6WDWH3DUN 6XPPHU3DUN
PRUH WKDQ HV IU&RPPXQLW*HQ6WXG\ &RUULGRU VLQH IDFLOLWLH
PLQRU HPLVVLRQV IURP FRQVWUXFWLRQ YHKLFOHV DQG DFWLYL
WKH UHJLRQ LQFOXGLQJ WKHVH
ZRXOG EH KLJKO\ ORFDOL]HG DQG ZRXOG QRW LPSDFW QRLVH O

$V GLVFXVVHG LQ 6HFWLRQ &RUULGRU &RQVWUXFWLRQ
6WXG\ &RQVWUXFWLRQ VLWHV DUH DVVRFLDWHG ZLWK UDQFKLQJ DF
FXOWXUDO ZRUN&RQVWUXFWLRQ EHFDXVH WKH
DUHDV &RQVWUXFWLRQ VXUIDFH VXUYH\V ZRXOG EH FRPSOHWHG SULRU
SRWHQWLDO LPSDFWV IURP WKH WUDQVPLVVLRQ OLQH IDFLOLWL
RFFXU GXULQJ FRQVWUXFWLRQ ZRXOG EH PDQDJHG WKURXJK D 8

3URWHFWDWLRQ

'XH WR QR DQWLFLSDWHG LPSDFWV

&RQFOXVLRQ

,PSDFWV WR JHRJUDSKLF &XOWXUDO &RUULGRU WUDQVPLVVLRQ
WKHUHIRUH QRW H[SHFWHG WKDW WKH SURSRVHG ORFDWLRQ RI
LPSDLU JHRJUDSKLF UHVRXUFHV

0LOLWDU\ $FWLYLWLHV DQG $YLDWLRQ

,PSDFW $VVHVVPHQW 0HWKRGV

$VVHVVPHQW RI LPSDFWV RQ
RSHUDWLRQ DQG PDLQWHQDQFH
PHWKRGRORJLHV DQG LV GLVFXVVHG EHORZ &RQVWUX
PDLQWHQDQFH LPSDFWV DUH JHQHUDOO\ DYRLGDEOH LQ QDWXU

,PSDFWV 6FSWRL&RKUHQD7*LHQ6WXG\ &RUULGRU

$SSUR[LPDWHO\ WKUHH
URXWHV&RQVWUXFWLRQ &RUULGRU'HYRKOORSPHQW)$$ WR

UHTXHVWRU1WWKDQVPLVVLRQ OLQH IDFLOLWLHV %DVHG RQ WKH KI
ORFDWLRQRDRUI\ HDLQG DYLDWLRQUDHQWRXUFHRQ OLQH IDFLOW\ FRQV
PDLQWHQDQF&RUZRQWKL*HQWKXG\Z&RXURUGLRPSOLFWDU\ DFWLYLWLHV D
DYLDWLRQ

3URWHFWDRXUHV

3URWHFWLRQZRHDVXUHVDWRUHGXFH DQ\ SRWHQWLDO QHJDW
LPSDFWV IURP FRQVWUXFWLRQ DFWLYLWLHV LQFOXGH

Mil-1 &RRUGLQDWH ZLWK PLOLWDU\ EDVHV DQG DYLDWLRQ IDFL

Mil-2 8VH)$$ DSSURYHG OLJKWLQJ DV UHTXLUHG

&RQFOXVLRQ

,PSDFWV WRWPLLYOLWLHV\ DQG ZDRXLEHGVDRQLGHVGRXUWHUDQVPLVVLRQ O
H[WHQW SURFHWULHWRE\HQRW H[SHFWHG WKDW WKH SURSRVHG ORF
ZRXOG XQGXO\ LPSDLU PLOLWDU\ DFWLYLWLHV DQG DYLDWLRQ U

5RDGV

,PSDFW $VVHVVPHQW 0HWKRGV

$VVHVVPHQW RI LPSDFWV WR URDGV IURRPQWWKHUXWUDQVPLVVLRQ
PDLQWHQDQF&RZRQWL*HQWKXG\IR&OORZGWKH LPSDFW DVVHVVPHQ
GHVFULEHGHSWDEURYH DQG LV GLVFXVVHG EHDQG&RQWUDFWRU
LPSDFWV DUH JHQHUDOO\QGRZHVPRUWDU\ LQ QDWXUH IRU URDGV

,PSDFWV 6SHFLILF&RQD 7*HQ6WXG\ &RUULGRU

3RWHQWLDO LPSDFWV RE&GVJURHUDWRGVXULQJ FRQVWUXFWLRQ RI WUD
&RQVWUXFWLRQ HTXLSPHQWKDQSDOQWWKHGHVJHUGGWHUDH[LVWLQJ URDG
3DWWHUQ 'HZRXOGRSXHEHQWRSWHUXFWLRQ URDG FRQGLWLRQV DQG U
FRQVWUXFWLRQ&RQWUXFWLRQ RU EHWWHU RQFH FR
WUDIILFQWUXFWLRQ LV FRPSOHWHG DQG VKRUW WHUP EDVHG RQ ZKH
FRQVWUXFWLRQ LV RFFXUULQJ WKDW &RUURQWZ*HHQWXG&RPSOHWH
DUH DQWLFLSDWHG EDVHG RQ 3URMHFW[HGXOHV RI WKH SURSRVHG
URDGV XVHGQG/WRUXFWLRQ FRQGLWLRQV

3 U R W H F W L R Q F H D R X U H V

3 U R W H F W L R Q Z R H D V X U H V O W K H Q W H G W R U H G X F H D Q \ S R W H Q W L D O
F R Q V W U X F W L R Q D F W L Y L W L H V L Q F O X G H

Road-1: 3 U H F R Q V W U X F W L R Q F R Q G L W L R Q V Z L O O E H Y H R X S H Q W R G D
U R D G X V H D J U H H P H Q W Z L W K Q 1 0 Z G D Q G F H R X X W H 5 R D G
0 D L Q W H Q D Q F H D V S D H F W H V Q W \

Road-2: & R Q V W U X F W L R Q V S H H G K H G L P L W V Z L O O E H H V W D E O L

& R Q F O X V L R Q

% D V H G R Q O R F D O L] H G O R Z D W K R U Q W H R P S D Q W V D Q G R U H W X U
X V H G I R U F R Q V W U X F W L R Q V R Q S U R Q G L W L R Q V Z H O O D V W K H S U R
Q R W H [S H F W H G W R K D W L R K H R S U R K R W H G D Q V P L V V L R Q O L Q H I D F L O L W

&2168/7$7,21 $1' &22,1$7,21

7KH IROORZLQJ LQGLYLGXDOV DQG PDWHULDOV KDYH FRQWULEX
&RPSDQ¶QHU WKH*HQXEWWDWQGRQZLWFK\DUG

/LVW RI 3UHSDUHUV DQG 5HYLHZHUV

3DWWHUQ 'HYHORSPHQW

- $GD&PHUQHD &ODUN 0DQDJHU (QYLURQPHQWDO DQG 1DWXUD
- &U\VWDO &RIIPDQ 0DQDJHU %XVLQHVV 'HYHORSPHQW
- &DU1DMM6DHFLDO &RXQVHO
- 'DQ 1DMMDU 6SHFLDO &RXQVHO

%XUQV 0F'RQQHO

- 3DXO &D3UDWKHDFW 3ULQFLSDO
- &KULV .QRSS 3URMHFW 0DQDJHU
- %RE 5RZH 6HQLRU $UFKHRORJLVW
- &RG\ &ODUN %LRORJLVW
- %ULDQ 3DUNHU *HRJUDSKLF ,QWHJUDWLRQ 6\VWHPV 0DQDJ
- .\OH %RDWULJKW *HRJUDSKLF ,QWHJUDWLRQ 6\VWHPV 6SHF

7HFKQLFDO &RQVXOWLQJ WR WKH (QYLURQPHQWDO 5

- &ULWLFDO ,VVXHV $QDO\VLV IRU W5KHS3UR(6I,QF0RUE
- &ULWLFDO ,VVXHV $QDO\VLV IRU WKH 3URSRVHG(&RZ0HV
  0DUFK
- &ULWLFDO ,VVXHV$QDO\VLV 3URSRVHG 9LVXDO5HVRXUFH3URMHF

- &XOWXUDO 5HVRXUFHV 6XUYH\ RI 3URSRVHG :LQG&RXQW\ &RQW\ 1HZ 0H[LFR 5HSRUW %ODQWRQ $VVRFLDWHV ,QF
- &XOWXUDO 5HVRXUFHV 6XUYH\ RI 3URSRVHG :LQG 7XUELQH /RFDWLRQV DW 3URMHFW 7UDQVPLVVLRQ &RXQW\ 1HZ 0H[LFR 5HSRUW %ODQWRQ $
- &XOWXUDO 5HVRXUFHV 6XUYH\ RI 3URSRVHG :LQG 7XUELQH 3URMHFW 7UDQVPLVVLRQ 1HZ&RXQW\ 5HSRUW %ODQWRQ $VVRFLDWHV
- &XOWXUDO 5HVRXUFHV 6XUYH\ RI 3URSRVHG :LQG 7XUELQH 3URMHFW 7UDQVPLVVLRQ &RXQW\ 1HZ 0H[LFR 5HSRUW %ODQWRQ $

x &XOWXUDO 5HVRXUFHV 6XUYH\ RI 3URSRVHG :LQG 7XUELQH /RFDWLRQV DW 7H
7RUUDQFH &RXQW\ 1HZ 0H[LFR 5HSRUW %ODQWRQ $VVRF
x &XOWXUDO 5HVRXUFHV 6XUYH\ RI 3URSRVHG :LQG 7XUELQ
&ORXG :LQG 7RUUDQFH &RXQW\ 1HZ 0H[LFR 5HSRUW %ODQWRQ $VVR
x 5DSWRU 1HVW 6XUYH\ 3DWHUQ :LQG (7HUF\ 3URMHFW H
x 6LWH &KDUDFWHUL]DWLRQ 6WXG\ 5HSRUW :LQG (QHUJ\ 3U
x 7KH (FRQRPLF DQG)RIWKH &RURQD :LQG 3URMHFW \ 1HZ 0H
3K'
x :DWHUV RI WKH 8 6 DQG %LRORJLFDO 5HVRXUFHV $VVHVVPH
/RFDWLRQV DQG $FFHVV 5RDGV DW WKH &RXQW\ 1HZ 0H[L
%ODQWRQ $VVRFLDWHV ,QF
x :DWHUV RI WKH 8 6 DQG %LRORJLFDO 5HVRXUFHV $VVHVVPH
/RFDWLRQV DQG $FFHVV 5RDGV DW WKH &RXQW\ 1HZ 0H
5HSRUW %ODQWRQ $VVRFLDWHV ,QF
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/RFDWLRQV DQG $FFHVV 5RDGV DW WKH &RXQW\ 1HZ 0H
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/RFDWLRQV DQG $FFHVV 5RDGV DW WKH &RXQW\ 1HZ 0H[
5HSRUW %ODQWRQ $VVRFLDWHV ,QF
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/RFDWLRQV DQG $FFHVV 5RDGV DW WKH &RXQW\ 1HZ 0H[
5HSRUW %ODQWRQ $VVRFLDWHV ,QF

5HFLSLHQWV RI WKH (QYLURQPHQWDO 5HSRUW
x /LQFROQ 7RUUDQFH *XDGDOXSH &RXQW\ %RDUG RI &RXQW\ &
x /LQFROQ 7RUUDQFH *XDGDOXSH &RXQW\ 0DQDJHU
x /LQFROQ 7RUUDQFH *XDGDOXSH &RXQW\ 5RDG 6XSHULQWHQ
x &LW\ RI &RURQD &LW\ &RXQFLO
x 0D\RU&RURQD
x &RURQD &LW\ 0DQDJHU
x &LW\ RI 'XUDQ &LW\ &RXQFLO
x 0D\RU'XUDQ

- 'XUDQ &LW\ 0DQDJHU
- &RURQD (OHPHQWDU\ +LJK 6FKRRO
- (VWDQFLD (OHPHQWDU\ 0LGGOH +LJK 6FKRRO
- 9DXJKQ (OHPHQWDU\ +LJK 6FKRRO
- 1HZ 0H[LFR (RYLURQPHQW 'HSDUWPHQW
- 1HZ 0H[LFR 6WDWH (QJLQHHU
- 1HZ 0H[LFR $RWWR*UHQHU\ UDO
- 1HZ 0H[LFR 6WDWH 7DQGILFH

/,7(5$785(&,7('

1DWLRQDO /DQG 1&/R&Y HU 'DDWWEDQHR5DHGWULHYHG 'HFHPEHU
KWWSV ZZZ PUOF JRY QOFG SKS

$PHUL&FDQHWHULH&VHPHWDULHV RI *XDGDOXSH&RXQW\PEHU IU
KWWS ZZZ DPHULFDQFHP[LFRWRJXDGDOXSHQHZ

$PHULFDQ &HPHWHULHVMURI /LQFROQW&RXQW\ 'HFHPEHU IURP
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$PHULFDQ &HPHWHULHV RI /LQFROQ&RXQW\ 'HFHPEHU IURP
KWWSV QHZPH[LFR KRPHWRZQORFDWRU FRP IHDWXUHV FXOW

$PHULFDQ &HPHWHULHV RI 7RUUDQFH&RXQW\ 'HFHPEHU IURP
KWWSVP H[QHZ KRPHWRZQORFDWRU FRP IHDWXUHV FXOWXUDO F

$QGHUVRQ 2 - -RQHV * (*DRGGDUGHDQ PDS RI 1HZ 0H[LFR 8 6
6XUYH\RUV 2IILFH 5HSRUW 5HWULHYHG 'HFHPEHU IURP
KWWS SXEOLFDWLRQV RIU

%DUU (QJLQHHULQJ3&RQVXOWDQWV *HRWHFKQLFDO (QJLQHHULQJ 5

%DW &RQVHUYDWLRQ ,QWHUQDWLRQDO %DWV LQ &DYHV &ROOHFWLRQ 'HFHPEHU I
KWWS ZZZ EDWFRQVHUY RUJ ZZZ EDWFRQ RUGXFDWLRQ SURJUDPV SXEOLFDWLRQV

%ODQWRQ $VVRFLDWHV&XOWXUDO 5HVRXUFHV 6XUYH\ RI 3URSRVH
DW WKH $QFKR 3URMHFW /LQFROQ &RXQW\ 1HZ 0H[LFR

%ODQWRQ $VVRFLDWHV&XOWXUDO5HVRXUFHV 6XUYH\ RI 3URSRVHG
DW WKH 9LHQWR /RFR :LQG 3URMHFW 7RUUDQFH &RXQW\ 1HZ

%ODQWRQ $VVRFLDWHV&XOWXUDO 5HVRXUFHV 6XUYH\ RI 3URSRVH
DW WKH &RZER\ 0HPRULDO:LQG3URMHFW &RQGF 1HZ 0H[LFR

%ODQWRQ $VVRFLDWHV&XOWXUDO 5HVRXUFHV 6XUYH\ RI 3URSRVH
DW WKH 'XUDQ 0HVD :LQG 3URMHFW 7RUUDQFH &RXQW\ 1HZ 0

%ODQWRQ $VVRFLDWHV&XOWXUDO 5HVRXUFHV 6XUYH\ RI 3URSRVHG 7XUELQH /
DW 7HFRORWH :LQG 3URMHFW 7RUUDQFH &RXQW\ 1HZ 0H[LFR

%ODQWRQ $VVRFLDWHV&XOWXUDO 5HVRXUFHV 6XUYH\ RI 3URSRVH
DQG $FFHVV 5RDGV DW WKH 5HG &OLIIHG :LQG3URMHFW 7RUUD

%ODQWRQ $VVRFLDWHV, QF WKH D 6 DQG %LRORJLFDO 5HVRXU
3URSRVHG :LQG 7XUELQH /RFDWLRQV DQG $FFHVV 5RDGV DW W
1HZ 0H[LFR

%ODQWRQ $VVRFLDWHV, QF WKH E 6 DQG %LRORJLFDO 5HVRXUFH
3URSRVHG :LQG 7XUELQH /RFDWLRQV DQG $FFHVV 5RDGV DW W
&RXQW\ 1HZ 0H[LFR

%ODQWRQ $VVRFLDWHV, QF WKH F 6 DQG $VVRFLDWHV RI 5HVRXU
3URSRVHG :LQG 7XUELQH /RFDWLRQV DQG $FFHVV 5RDGV DW W
&RXQW\ 1HZ 0H[LFR

%ODQWRQ $VVRFLDWHV, QF WKH G 6 DQG %LRORJLFDO 5HVRX
3URSRVHG :LQG 7XUELQH /RFDWLRQV DQG $FFHVV 5RDGV DW W7KHUH7HEHR&RXQW\
1HZ 0H[LFR

%ODQWRQ $VVRFLDWHV, QF WKH H 6 DQG %LRORJLFDO 5HVRXU
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&RXQW\ 1HZ 0H[LFR

%URDGKHDG 6XEVXUIDFH JHRORJ\ DQG RLO DQG JDV SRWHQWLD
0H[LFR S 6RFRUUR 1HZ 0H[LFR %XUHDX RI *HRORJ\ DQG 0

%XUHDX RI /DQG 0DQDJHPHQW /DQG 2II5HVRXUFH 0DQDJHPHQW 1RYHPEHU IU
KWWSV JORUHFRUGV EOP JRY

'LJLWDO $YLDWLRQ &RUULGRUV /DQG5HWULHYHUHRPWWS YIUPDS FRP WRV KWPO

H%LUG H%LUG $Q 2QOLQH 'DWDEDVH RI %LUG&DOO%DVHG&RQVHUYDWLRQ D
2UQLWKRORJ\ 5HWULHYHG -XO\ IURP KWWS HELUG RUJ F

(QYLURQPHQWDO 3URWHFWLRQ $JHQF\ (QYLURQPHQWDO5HYLHZHG 1RYHPEHU IUR
KWWSV ZZZ HSD JRY HFULWLFDO HFRV\VWHPV

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'HFHPEHU IURP KWWSV PVF IHPD JRY SRUWDO VHDUFK

+RPHU & * 'HZLW] - $ <DQJ / -LQ 6 'DQLHOVRQ 3 ;LDQ
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/LQFROQ &RXQW\ &RXQW\ 6RLO DQG :DWHU &RQVHUYDWLRQ 'LVWULF

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0LOLWDU\ %DVHZV 0H[LFR 0LOLWDU\ 5HVWULFWHG $UHDV KWWSV PLOLWDU\EDVHV FRP QHZ

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1HZ 0H[LFR &XOWXUDO +DEL1WDW&W-$7V VHV&VUXHQDO7RRO%LWDW 'DWD 1H +DELWDW ,QIRUPDWLRQ ([WUDFWHG YHUVLRQ HGLWHG 'DWD KWWS QPFKGDWZLQRUJGDWDKWPO

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1HZ 0H[LFR 'HSDUWPHQW RI *DPH DQG)LVK 6\VWHP%LRORJLFDO 0 &RQW\ )HGHUDO 6WDWH 6SHFLHV 6WDWXV IRU/LLQFHYRHOQ WH)HEUXDU\ IURP KWWSSJ ZZZ EKLWWRQ UZZZ EHSURVV DSS"UW\S

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6RXWKHUQ *UHDW 3ODLQV &UXFLDO6HWDUEHLHYDHG $HVFHHPEHPUHQW 7RRE KWWSV NDUV NX JHSGFXKDJWRGDWD PDSV V

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8 6 'HSDUWPHQW RI 7UDQVSRUWDWLRQ 6XUYH\ 6HR*UDSKLF DVSHFWV IRU 1HZ 0H[L 5HWULHYHG 'HFHPEHU IURP KWWS DSSV FHL SVX HGX VRL

8 6)LVK DQG :LOGOLIH 6HUY'LFH RI 0LJUDWRU\ %LUG 0DQD &RQVHUYDWLRQ 5HJLRQ 5HWULHYHG 'HFHPEHU IURP KWWSV ZZZ IZV JRY PLJUDWRU\ELUGV SGI JUDQWV %LUGVRI&

8 6)LVK DQG :LOGOLIH 6HUYLFH 6HUYLFH &RQVHUYDWLRQ 2QH 3URILOHV HWULHYHG 'HFHPEHU IURP ZZZ IZV JRY VRXWKHDVW FRQVH WRROV HQYLURQPHQWDOLQHURDFK HP

8 6)LVK DQG :LOGOLIH 6HUYLFH ,3D&5HWULHYHG 'HFHPEHU IURP KWWSV HIURRP IZV JRY LSDF

8 6)LVK DQG :LOGOLIH 6HUYLFH 1DWLRQDO :HW'D,Q'HW'DQDYDSQSWHRU\ 5HWULHYHG 'HFHPEHU KWWSV ZZZ IZV JRY ZHWODQGV GDWD PDS

8 6)LVK DQG :LOGOLIH 6HUYLFHV E\ &RXQW\ 5HSRUW (QYLUR &RQVHUYDWLRQ 2QOLQH 6\VWHP (&26 KWWSV HFRV IZV JRYEHFFXSUUHQWVSHFLHVE\FRXQW\VSHFLHV

8 6*HRORJLF 6X6*6YH\ 1DWLRQDOSK\'DWDVHWV 'HYHOHG 'HFHPEHU IURKPWWSV QKG XVJV JRY WRROV KWPO

8 6*HRORJLF 6X6*6YH\ *DS $QDO\VLV 3URJUDP *$3 3URWHFWHG $ 'DWDE5HWULHYHG 'HFHPEHU IURP KEHWSV **DS**QDO\VLV XVJV JRY SDGXV

8 6*HRORJLF 6X6*6YH\ 7KH 1DWLRQDOHW 5HWULHYHG IURP KWWSV QDWLRQDOPDS JRY

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:(67 ,QF 0DUFK &ULWLFDO ,VVXHV $QDO\VLV 3URSRVHG &RZER\ 0

:(67 ,QF 0DUFK &ULWLFDO ,VVXHV $QDO\VLV 3URSRVHG 9LHQWR

:(67 ,QF $XJXVW 5SWR 6X1HWV 3DWWHUQ :LQG (QHUJ\ 3URMHFW

:(67 ,QF $XJXVW 6WXGLHV &KDUDFWHUL]DWLRQ 6WXG\ 3DWWHUQ :LQG

,1'(;

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WKURXJK ULJKZD\ LLL
WKURXJK ULYHU
DJULFXOWXUHWKURXJK
URDG XVH DJUHHPHQW
DLU TXDOLW\ VFHQLF E\ZD\ WKURXJK
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ODQG XVHV
PLFURZDYH VXUIDFHZDWHU
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QRLVH WKURXJK
WKURXJK
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RLO DQG SDWHQWL
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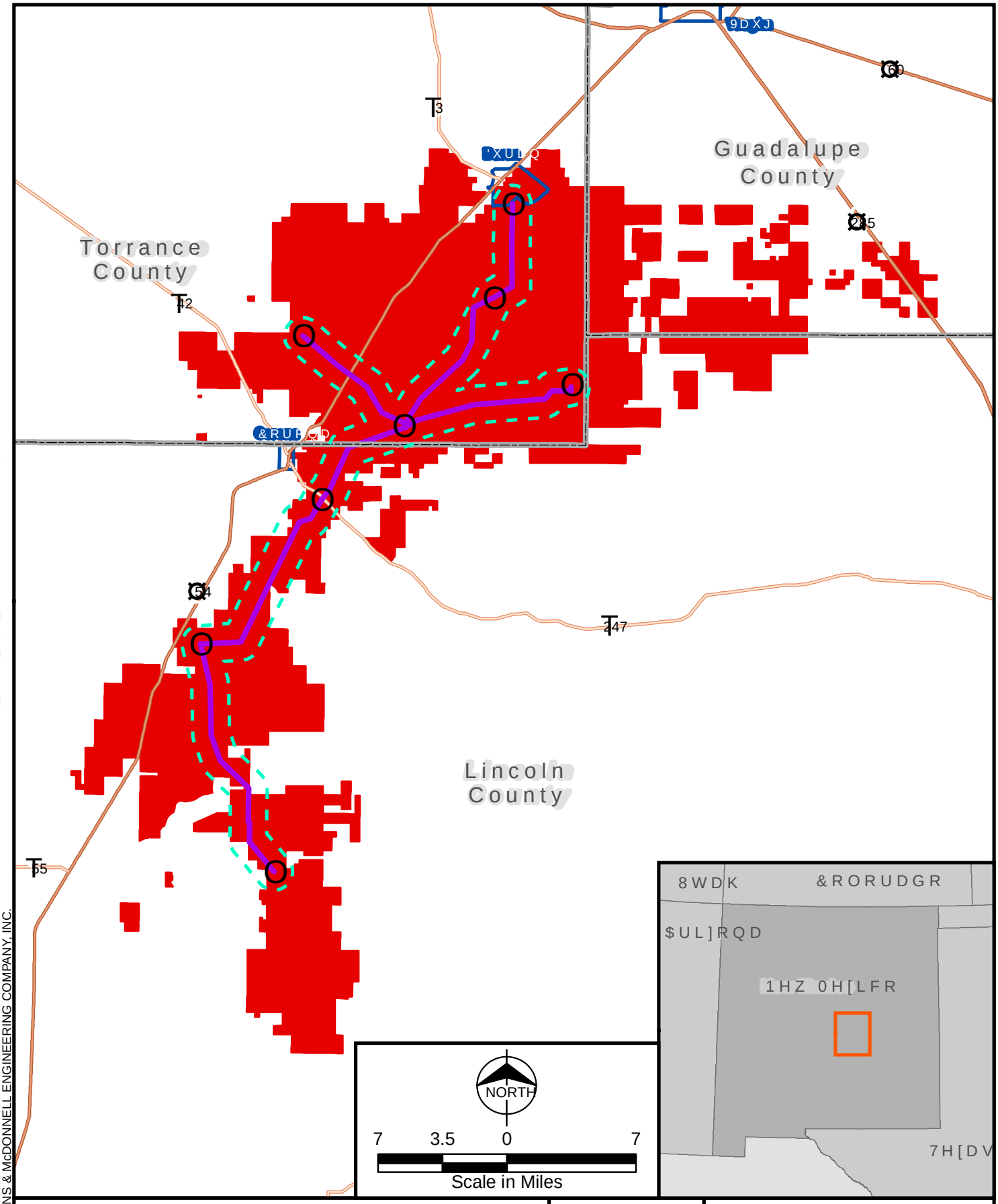

Exhibit 1
Project Area
Pattern Development
Corona Wind Energy Project
Guadalupe, Lincoln,
& Torrance Counties, NM

Path: Z:\Clients\ENS\PatternSCH\d\101335_CoronaWindENR\Studies\GeospatialDataFiles\ArcDocs\Report\101335_Corona_Fig01_ProjectArea.mxd kdboatright 3/1/2018

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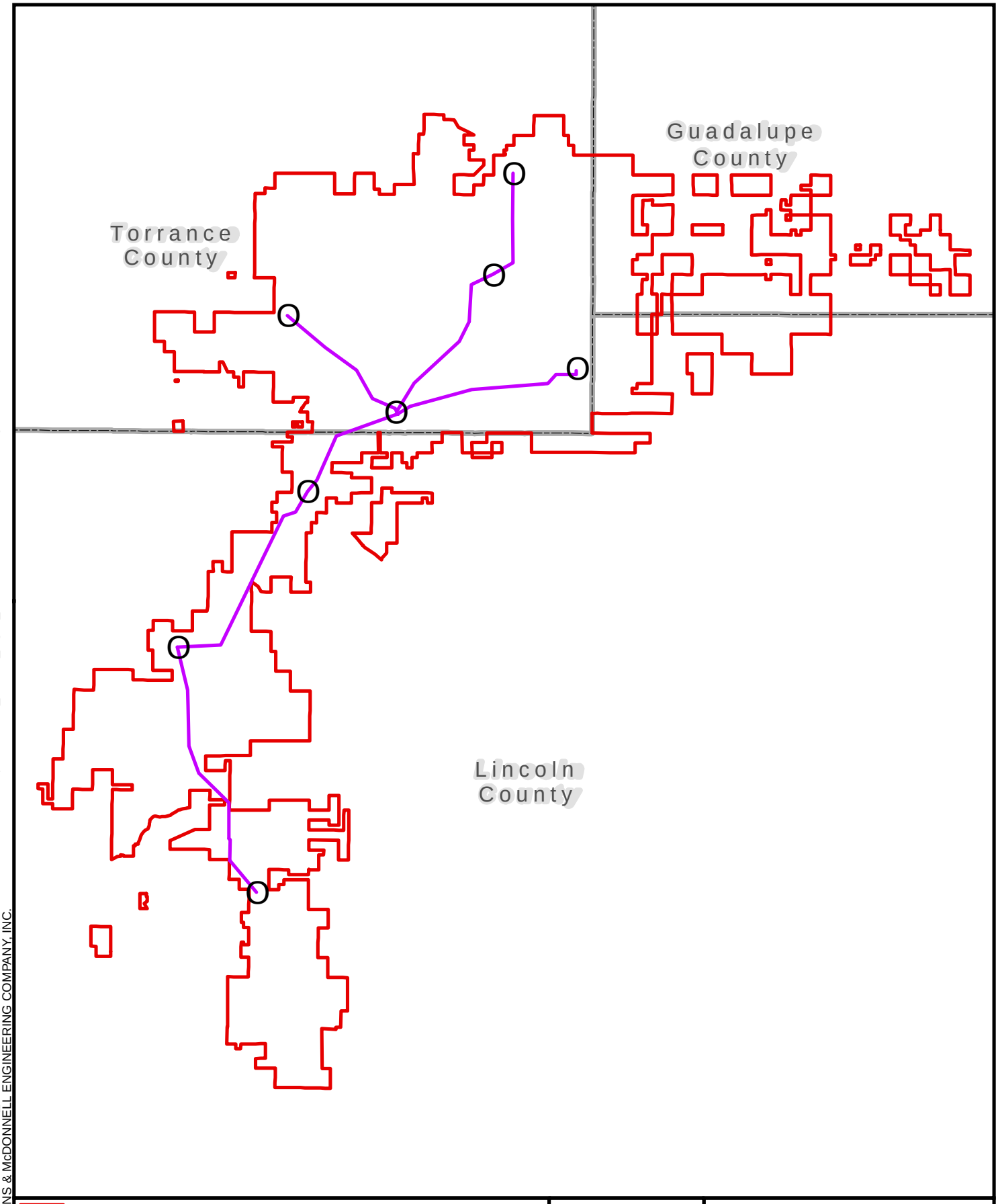

Exhibit 2
Assessment Area
Pattern Development
Corona Wind Energy Project
Guadalupe, Lincoln,
& Torrance Counties, NM

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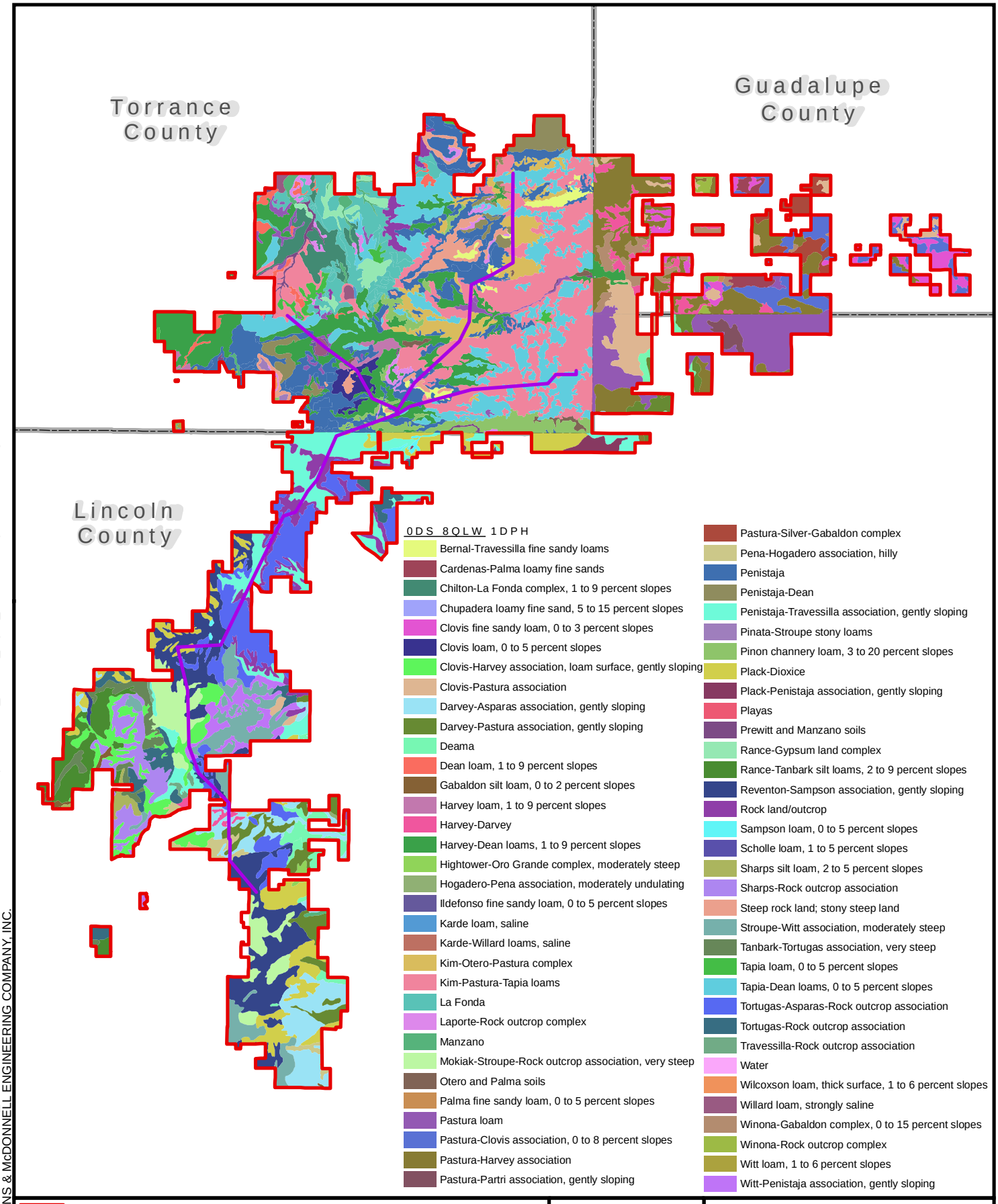

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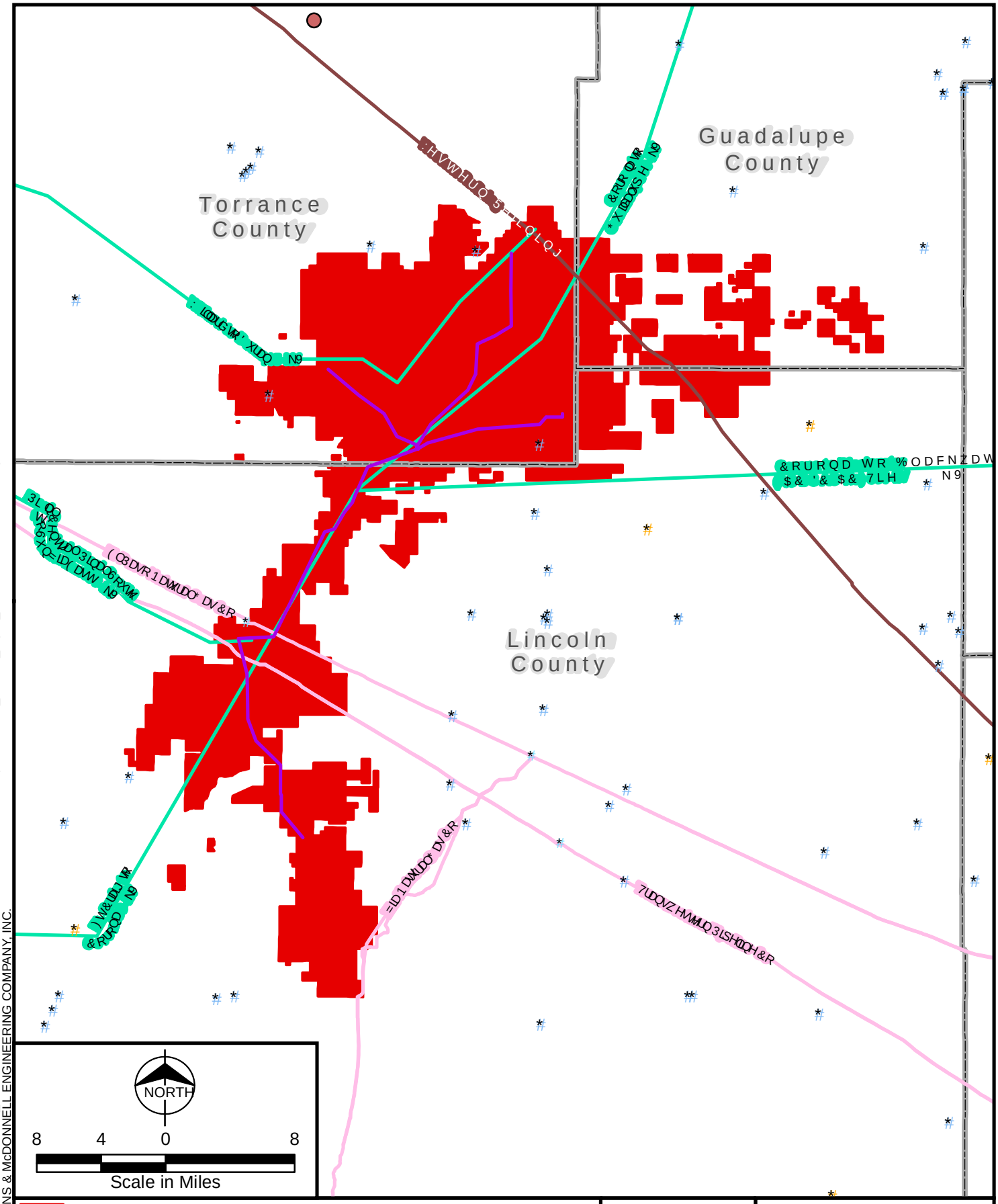

Exhibit 4
Oil & Gas Well Summary
Pattern Development
Corona Wind Energy Project
Guadalupe, Lincoln,
& Torrance Counties, NM

Source: Esri, Oil Conservation Division (OCD), Ventyx/Energy Velocity, Pattern Development, and Burns & McDonnell Engineering Company, Inc.

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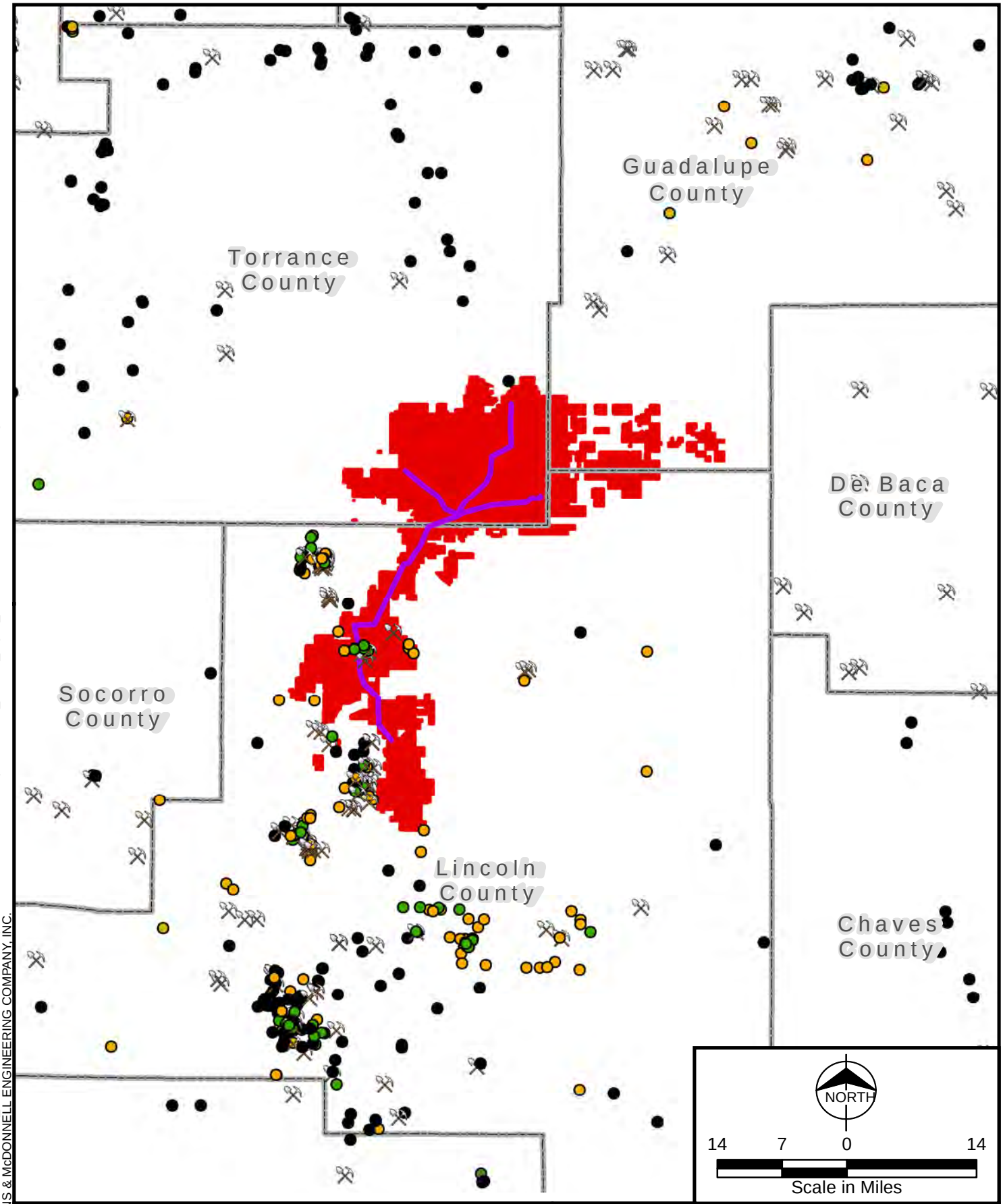

Exhibit 5
Mineral Resources Map
Pattern Development
Corona Wind Energy Project
Guadalupe, Lincoln,
& Torrance Counties, NM

Source: Esri, USGS-Mineral Resources Data System (MRDS), Pattern Development, and Burns & McDonnell Engineering Company, Inc.

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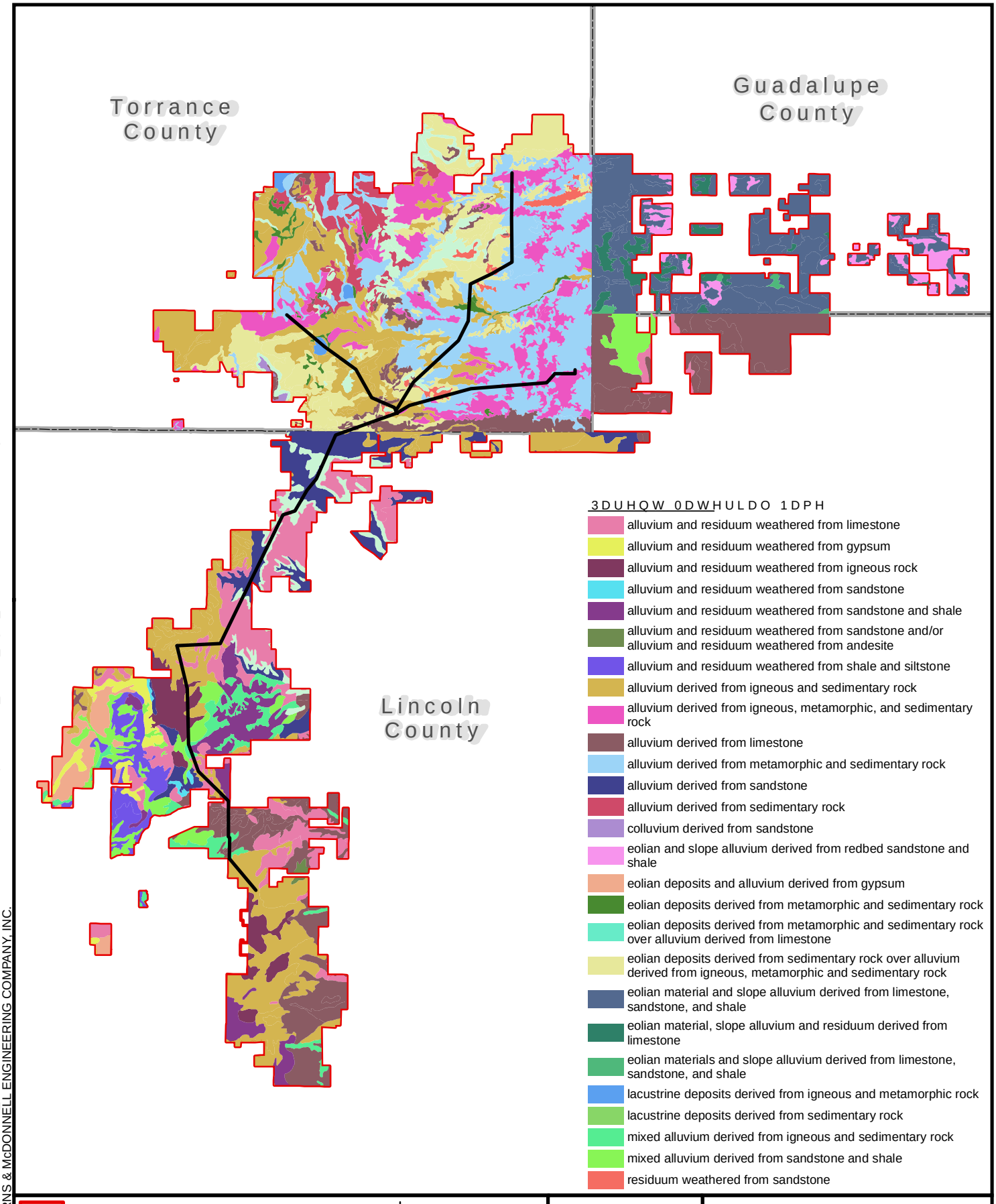

Exhibit 6
Parent Material
Pattern Development
Corona Wind Energy Project
Guadalupe, Lincoln,
& Torrance Counties, NM

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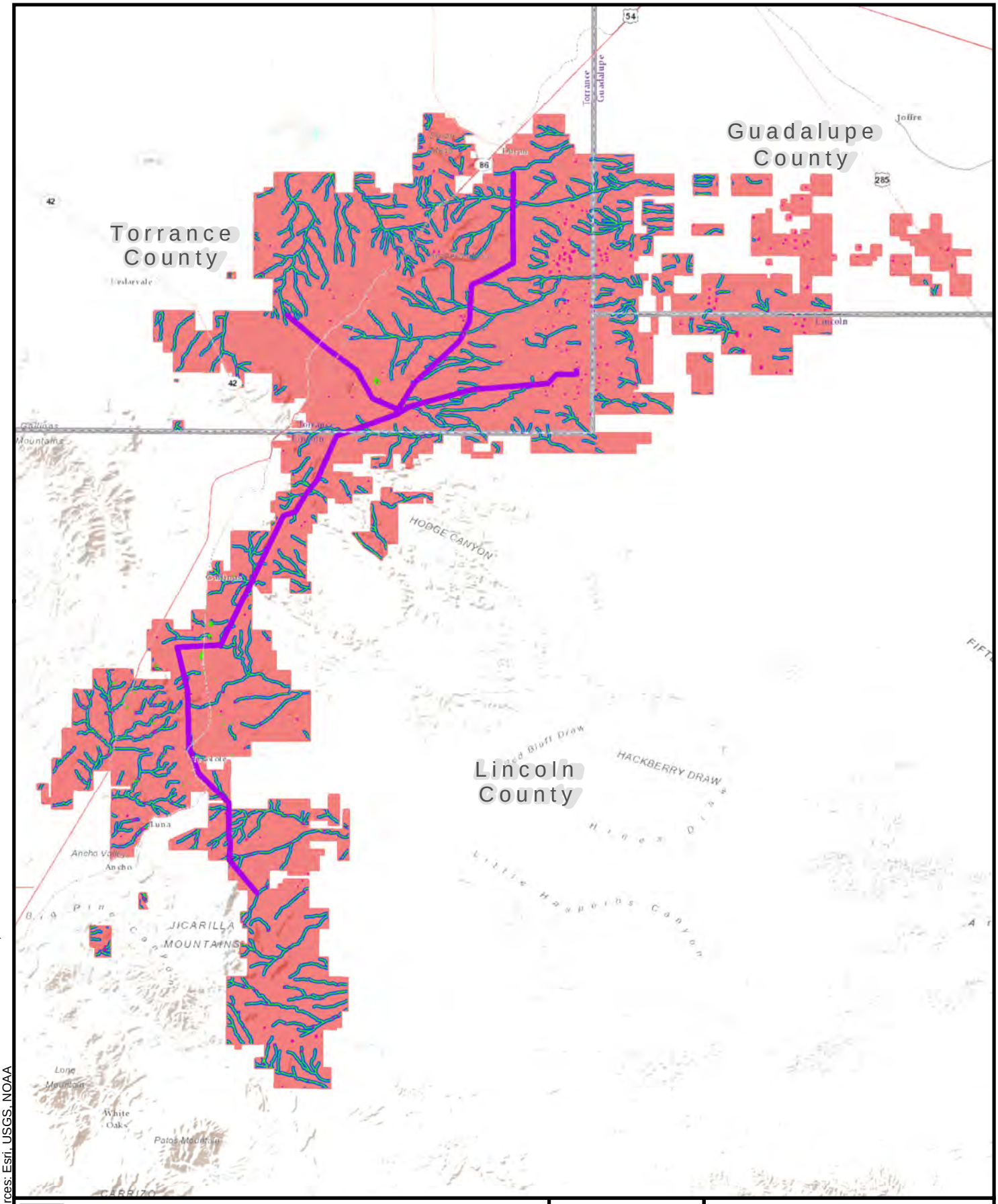

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Surface Waters
Pattern Development
Corona Wind Energy Project
Guadalupe, Lincoln,
& Torrance Counties, NM

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Service Layer Credits: Sources: Esri, USGS, NOAA

Source: Esri, USGS-National Hydrography Dataset (NHD), USFWS-National Wetland Inventory (NWI), Pattern Development, Ventyx/Energy Velocity, and Burns & McDonnell Engineering Company, Inc.

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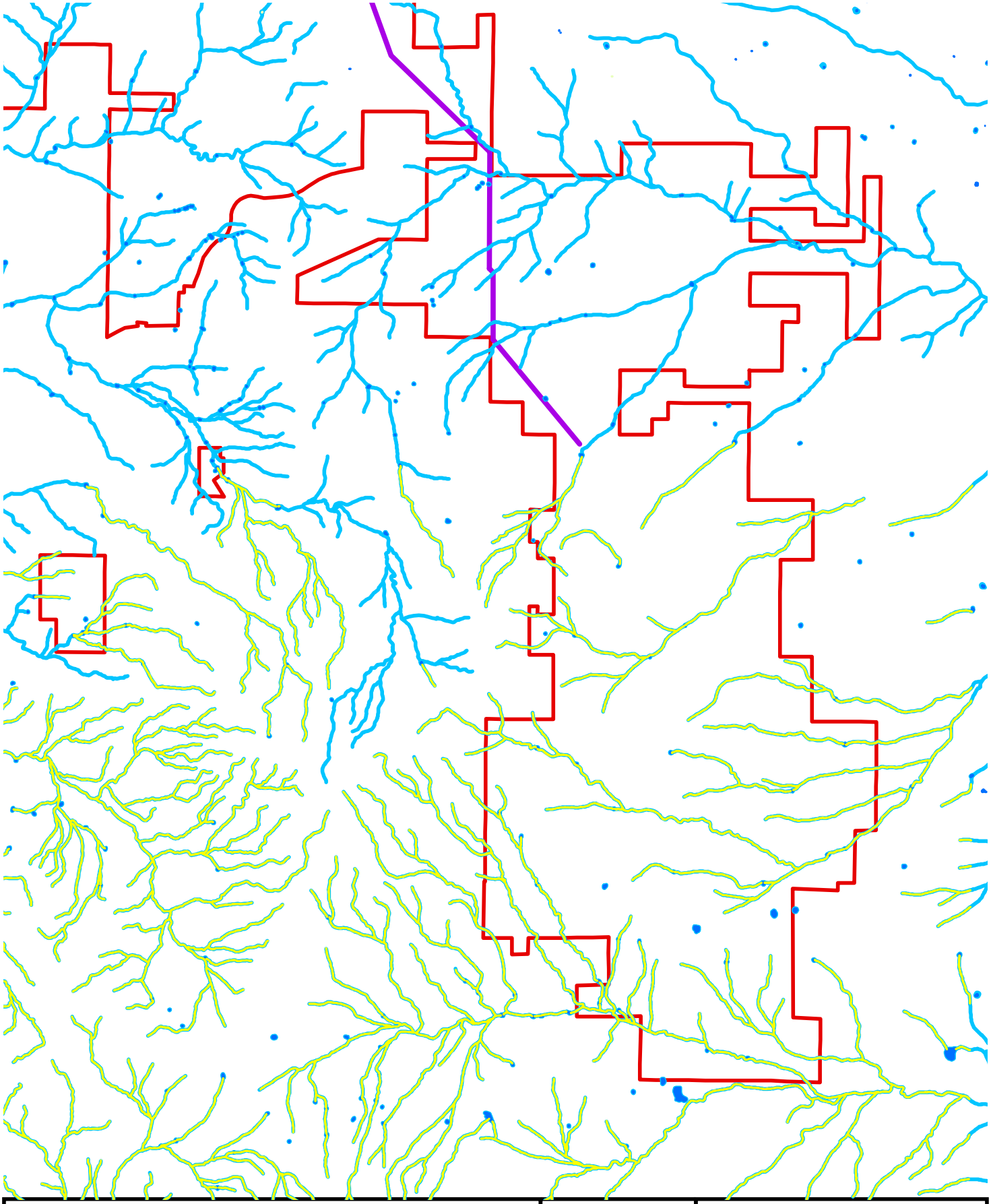

Exhibit 8
NWI Map
Pattern Development
Corona Wind Energy Project
Guadalupe, Lincoln,
& Torrance Counties, NM
Page 1 of 6

Source: Esri, USFWS-National Wetland Inventory (NWI), USGS-National Hydrography Dataset (NHD), Playa Lakes Joint Venture, Pattern Development, and Burns & McDonnell Engineering Company, Inc.

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